

**EPA Superfund
Record of Decision:**

**USA VINT HILL FARMS STATION
EPA ID: VA8210020931
OU 04
WARRENTON, VA
07/01/1999**

**FINAL
DECISION DOCUMENT
AREEs 13, 14, 16-1, 27, AND 29-4
VINT HILL FARMS STATION
WARRENTON, VIRGINIA**



Prepared for:

U.S. Army Communications-Electronics Command

Prepared by:

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Edgewood, Maryland

June 1999

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ABBREVIATIONS AND ACRONYMS

AAFES	Army, Air Force Exchange Service
AREE	Area Requiring Environmental Evaluation
bgs	below ground surface
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
CECOM	Communications-Electronics Command
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
DD	Decision Document
EEQ	environmental effects quotient
ENPA	Enhanced Preliminary Assessment
ERA	Ecological Risk Assessment
ft	feet
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICF KE	ICF Kaiser Engineers, Inc.
IEUBK	Integrated Exposure Uptake Biokinetic
MSL	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PAH	polynuclear aromatic hydrocarbon
ppm	parts per million
RBC	risk-based concentration
RI	Remedial Investigation
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
SRI	Supplemental Remedial Investigation
STP	Sewage Treatment Plant
TPH	total petroleum hydrocarbon
TRV	toxicity reference value
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VDEQ	Virginia Department of Environmental Quality
VHFS	Vint Hill Farms Station

DECLARATION FOR THE DECISION DOCUMENT REMEDIAL ALTERNATIVE SELECTION

Site Name and Location

Areas Requiring Environmental Evaluation (AREEs) 13, 14, 16-1, 27, and 29-4 Vint Hill Farms Station
Warrenton, Virginia

Statement of Basis and Purpose

This Decision Document (DD) presents a determination that no action is necessary to protect human health and the environment for soil at AREEs 13, 14, 16-1, 27, and 29-4 at Vint Hill Farms Station (VHFS), Warrenton, Virginia. This determination was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA) of 1986 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This document was prepared as a joint effort between the U.S. Army, the Virginia Department of Environmental Quality (VOEQ), and the U.S. Environmental Protection Agency (USEPA). The no action decision is supported by documents contained in the Information Repository

Description of the Selected Remedy

No action is the selected remedy for AREEs 13, 14, 16-1, 27, and 29-4. The Baseline Risk Assessment (BRA), conducted as part of the investigation activities, supports the no action decision.

Declaration

The no action remedy selection is based upon the findings of the BRA which determined risks within USEPA's acceptable risk range for each of AREEs 13, 14, 16-1, 27, and 29-4. Therefore, the selected remedy is protective of human health and the environment. A five-year review will not be necessary for these AREEs.



ROBERT L. NABORS
Major General, USA
Commanding
U.S. Army Communications-Electronics Command

7/1/99
Date

DECISION SUMMARY

1.0 INTRODUCTION

The no action decision is based on the Phase I Reuse Area Remedial Investigation (RI) Report (USAEC 1998) and the Phase II Reuse Area RI Report (USACE, 1999) which include Baseline Risk Assessments (BRAs) documenting the risks from contamination in the soil at Areas Requiring Environmental Evaluation (AREEs) 13, 14, 16-1, 27, and 29-4. In the BRA, it was determined that the soils at AREEs 13, 14, 16-1, 27, and 29-4 do not pose unacceptable risks to human health and the environment. Therefore the soils at AREEs 13, 14, 16-1, 27, and 29-4 require no action to be protective of human health and the environment.

2.0 SITE BACKGROUND

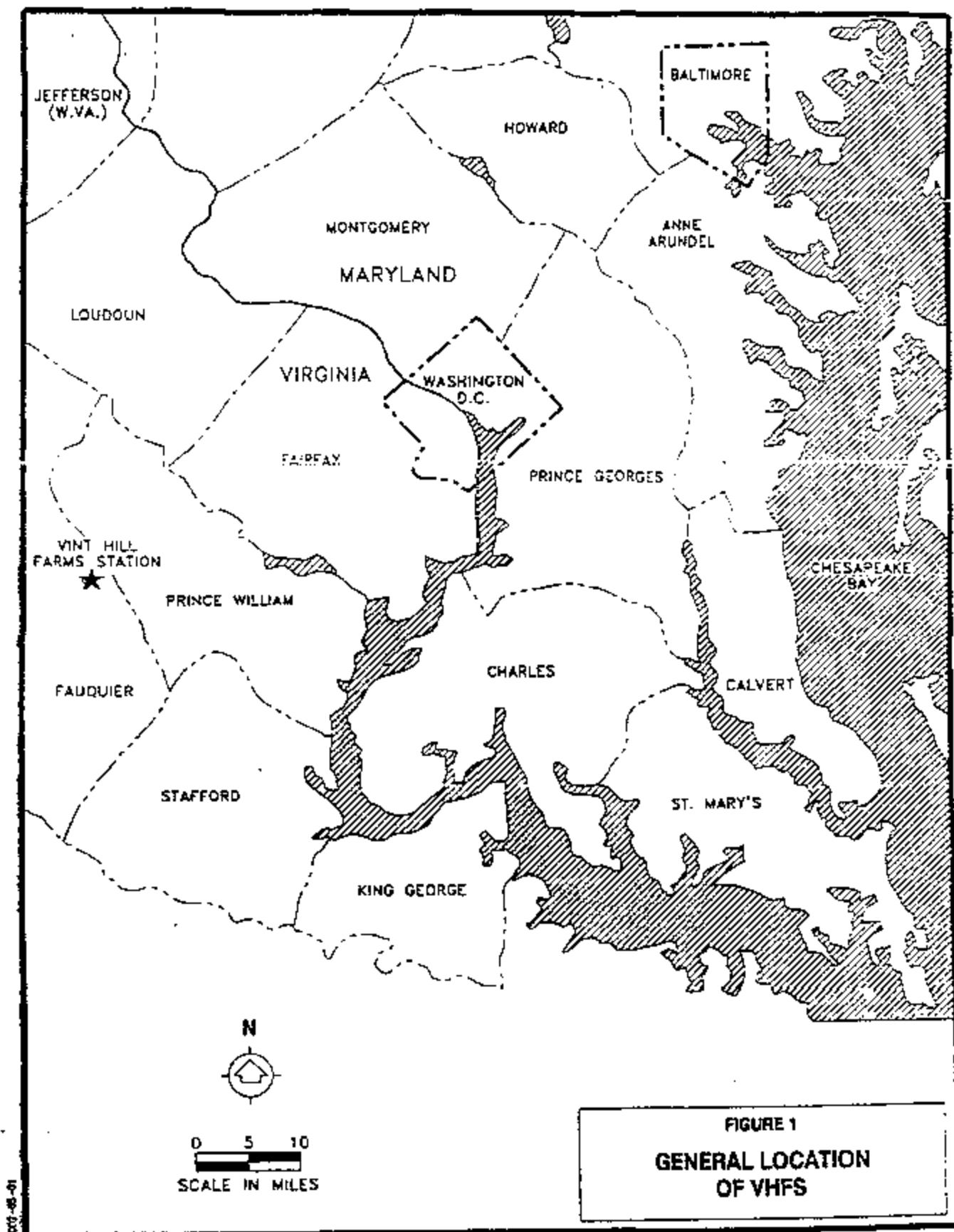
Vint Hill Farms Station (VHFS) is part of the U S. Army Communications - Electronics Command (CECOM) and, while active, primarily functioned as an Army installation engaged in communications intelligence. VHFS is located approximately 40 miles southwest of Washington, D.C., in Fauquier County, Virginia, as shown on Figure 1. The installation occupies approximately 701 acres of land near the town of Warrenton, Virginia. Approximately 150 acres of the installation are improved grounds in the southern portion of the property used for industrial operations, administration buildings, and residential housing. Approximately 94 acres in the eastern portion of the property are mature hardwood forest, and the majority of the remaining 457 unimproved and semi-improved acres in the northern portion of the property are used for stationary and mobile antenna operation sites.

VHFS was designated for closure in March, 1993, under the Base Realignment and Closure (BRAC) Act. Pursuant to the decision to close the installation, an Enhanced Preliminary Assessment (ENPA) and a Community Environmental Response Facilitation Act (CERFA) investigation of VHFS were conducted by Science Applications International Corporation (SAIC) to assess the environmental condition of the installation. The ENPA and CERFA investigations were completed in April and May, 1994, respectively. The ENPA identified 42 AREEs from the review of installation records, aerial photographs, installation personnel interviews, federal and state regulatory records, and visual inspection. Of these 42 AREEs, 27 were recommended for further investigation.

These 27 AREEs were investigated from September, 1994, to June, 1995, as part of the Site Inspection (SI) conducted by SAIC. The objective of the SI was to determine the presence or absence of contamination and the chemical nature of any detected contamination. The final SI Report (USAEC, 1996), which was completed in June, 1996, identified 24 AREEs which required further investigation. In addition, four new AREEs were identified during site reconnaissance to warrant further investigation subsequent to the SI. AREEs that were determined to warrant further investigation were investigated as part of the Phase I and Phase II reuse area RIs and the Supplemental Remedial Investigation (SRI) conducted by ICF Kaiser Engineers, Inc. (ICF KE). The purposes of these reports were to evaluate: 1) the nature and extent of contamination; and 2) the level of risk posed to human health and the environment. The final RI Reports for the Phase I and Phase II reuse areas (USAEC, 1998; USACE, 1999) were completed in April, 1998, and January, 1999, respectively. The draft SRI Report (USACE, 1998b) was completed in November, 1998.

Five AREEs were identified in the RIs and SRI as having soil contamination which poses no unacceptable human health risks and/or significant adverse ecological effects:

- AREE 13 - Sludge Disposal Area;
- AREE 14 - Skeet Range;



- AREE 16-1 – Possible Firefighter Training Pit:
- AREE 27 – Army, Air Force Exchange Service (AAFES) Service Station; and
- AREE29-4 – Disposal Area.

The locations of these AREEs are shown on Figure 2.

3.0 SITE CHARACTERISTICS

3.1 Site Topography

VHFS is located within the Piedmont Plateau physiographic province approximately 20 miles west of the Fall Line. The Fall Line is a physiographic boundary that separates the folded and faulted crystalline rocks of the Piedmont Plateau physiographic province from the unconsolidated sediments of the Atlantic Coastal Plain physiographic province. The topography of the Piedmont Plateau in the vicinity of VHFS consists of gently rolling hills with slopes generally less than 10%. Surface elevations on the installation vary from 335 to 430 feet (ft) above mean sea level (MSL).

3.2 Adjacent Land Use

Land use in the immediate vicinity of VHFS consists mainly of agriculture (mostly horse farms) and residential areas. With the exception of a few residences to the north the majority of residential development is located to the south of VHFS. A small county recreation park is located adjacent to VHFS along South Run

3.3 Surface Water Hydrology

VHFS is located in the Occoquan watershed. Most of VHFS drains to South Run via intermittent tributaries and drainage ditches, as shown on Figure 2. South Run is a small Class III Virginia stream which discharges into Lake Manassas, a recreation and drinking water reservoir built on Broad Run for the City of Manassas. Lake Manassas discharges to Broad Run, which drains to the Occoquan Reservoir. Drainage for the southern portion of the installation flows south and east to Kettle Run. Kettle Run converges with Broad Run approximately 10 miles downstream from Lake Manassas.

3.4 Geology/ Hydrogeology

The central portion of VHFS is underlain by folded sedimentary rocks of the Catharpin Creek Member which consists of sandstone, arkosic sandstone, siltstone, shale, and claystone. Intrusions of basalt, oriented northeast to southwest, cut the bedrock in the central and western portions of the VHFS installation. The northeastern flank of VHFS is underlain by intrusions of diabase. Quaternary alluvium is present along the major drainage channels within the installation.

The overburden is thickest (20-40 ft) in the southern regions of the site and thins to 0-10 ft in the northern areas. The overburden consists primarily of saprolite (a chemical and physical weathering product of the underlying bedrock) which underlies lesser amounts of clayey and silty soils.

Groundwater at VHFS occurs in fractured bedrock and to a lesser extent in the overburden. The bedrock aquifer is semi-confined, with the unfractured bedrock and saprolite acting as confining units. Recharge to the fractured bedrock aquifer occurs at outcrop areas and from percolation from the overburden along fractures. In the overburden, the aquifer is unconfined.

AREES LOCATIONS:

- 13. SLUDGE DISPOSAL AREA
- 14. SALT PANG
- 16-17 POSSIBLE EMERGENCY TRAINING PH
- 27. MISS SERVICE STATION
- 29-4. DISPOSAL AREA

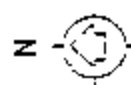
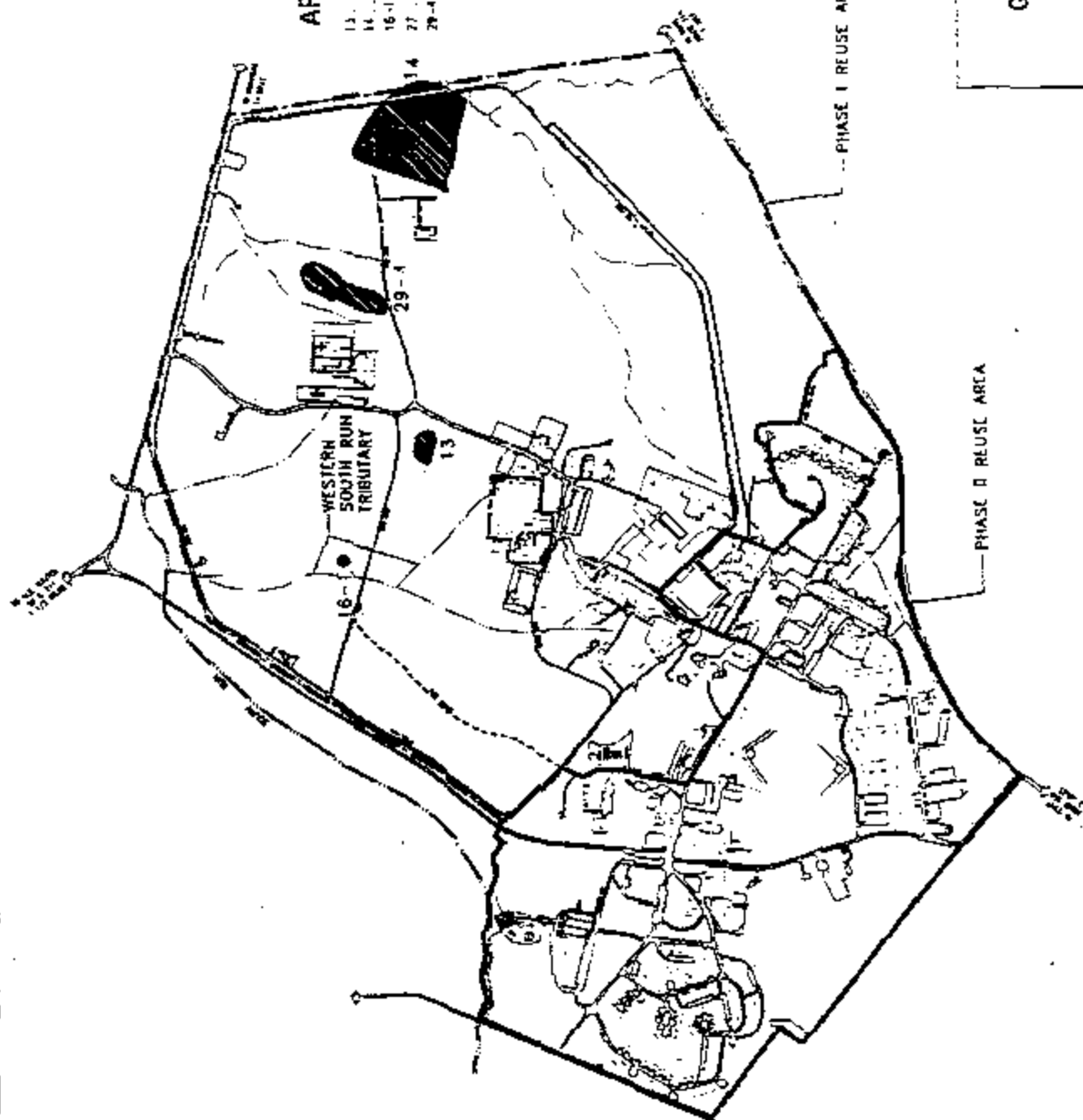


FIGURE 2

GENERAL LOCATIONS OF AREES AT VHS



4.0 SITE HISTORY AND INVESTIGATION FINDINGS

The RIs for these five AREEs were conducted to evaluate the nature and extent of contamination associated with past site activities. Environmental samples collected and analyzed during the RIs were used in conjunction with the results from the SI to assess the condition of each of the AREEs. The environmental media investigated included surface soil (0 to 2 ft below ground surface [bgs]), subsurface soil (2 ft to approximately 10 ft bgs), surface water, sediment, and groundwater. Analytical results were compared to background concentrations and regulatory screening levels to determine if environmental media had been adversely impacted by site activities. A brief description of each of the five AREEs and the significant findings of the RIs and SI are presented in the following paragraphs. A detailed presentation of the samples collected and the analytical results can be found in the Phase I Reuse Area RI Report (USAEC, 1998) and the Phase II Reuse Area RI Report (USACE, 1999), available in the Information Repository. Comments received from the U.S. Environmental Protection Agency (USEPA) on the final Phase I Reuse Area RI Report and on the AREE 14 Investigation Summary Report (USACE, 1998a) regarding these five AREEs along with the U S Army's responses are provided in Attachments 1 and 2, respectively.

4.1 AREE 13 – Sludge Disposal Area

The Sludge Disposal Area was used during the 1980s to dispose of sludges from the sewage treatment plant (STP) and the former STP, and sand filter sludge and sandblasting waste from the Electric Equipment Facility. In 1982, the sludges were analyzed for total metals and were determined by the U S Army to be at concentrations sufficiently low for land spreading. The sludge pile was 75 ft in diameter and 3 ft high. In 1992, the U.S. Army decided to close the sludge pile, and twenty thousand cubic feet of sludge were excavated, mixed with pressed sludge cake from the STP digester, and transported to the Fauquier County Landfill. The area has been backfilled and seeded.

Surface and subsurface soil samples were collected at locations within the disposal area during the SI and Phase I reuse area RI. Iron (75,200 to 230,000 parts per million (ppm)) was the only analyte detected above its residential soil risk-based concentration (RBC) (23,000 ppm) and maximum background concentration (70,800 ppm).

4.2 AREE 14 – Skeet Range

AREE 14 was used on weekends as a skeet range between 1961 and 1994. The spent ammunition, consisting of lead and steel shotgun pellets, was spread over the range and remains unrecovered. The skeet range firing fan is oriented eastward in an 800-foot radius and is separated into the Hit and Miss Zones.

Surface soil samples collected from two locations in the Miss Zone contained lead concentrations (940 ppm, and 414 - 650 ppm) that exceeded the USEPA screening level for lead in residential soil of 400 ppm. The lead concentrations in the Hit Zone did not exceed the USEPA screening level for lead in residential soil.

4.3 AREE 16-1 – Possible Firefighter Training Pit

Site history indicated that a Firefighter Training Pit was used at VHFS; however, the exact location of the pit is not known with certainty. AREE 16-1 represents one possible location of the Firefighter Training Pit. The Firefighter Training Pit was used monthly by the VHFS Fire Department for training in the mid-1970s. The unlined pit was approximately 50 ft in diameter and 3 ft deep. During training activities, the pit was partially filled with petroleum and natural gas odorant and then ignited. Solvents and other combustible materials may have also been used in the pit. In the mid-1980s, the pit was filled with ½ -inch gravel.

Total petroleum hydrocarbon (TPH) field screening of the soil at AREE 16-1 was conducted to delineate the area of contamination and to determine where soil samples should be collected for laboratory analysis. Surface soil samples were collected based on positive TPH results from the field screening. Arsenic (up to 21.6 ppm) exceeded its residential soil RBC (0.43 ppm) as well as its maximum background concentration (4.89 ppm) in the surface soil samples collected at AREE 16-1. A number of exsiccifurans indicative of combustion operations, were detected in the surface soil samples. 2,3,7,8-TCDD (2.4E-04 ppm) was the only dioxin/furan to exceed its residential soil RSC (4.3E-06 ppm).

4.4 AREE 27 — AAFES Service Station

The AAFES Service Station (Building 238) was constructed in 1969 to provide fuel and service for VHFS personnel vehicles. The service station had underground storage tanks (USTs) for three grades of gasoline, a pump area, and a service station area with two lifts. Drains in the pump island area lead to a grit chamber, which discharges to a field north of the facility. In addition, a fenced storage area was located in the rear of the facility for tires, batteries, and drums. Several gasoline, oil, and other spills were reported in this area. In April, 1993, pressure testing of the regular unleaded gasoline pipeline confirmed a suspected leak. A 0.5-inch hole was found in the pipeline within the pump area. The corroded section of pipe was replaced, and the soils around the area where the leak occurred were excavated and then backfilled. The system was re-tested to ensure no other leaks existed, and the pump was re-opened. During the summer and fall of 1993, field investigations confirmed soil and groundwater contamination due to the release of gasoline from one or more leaking USTs and associated distribution piping. The USTs were closed in June 1994, and removed in November, 1994. Operations at the AAFES Service Station were discontinued in the fall of 1994. Contaminated soil removal and groundwater remediation activities at the AAFES Service Station have been initiated and are being handled separately from the rest of AREE 27.

Surface and subsurface soil samples were collected from areas of potential contamination downgradient from the discharge point of the grit chamber, at the service bay spill run-off area, and in the tire storage area. Arsenic (up to 12.2 ppm) was found to exceed its residential soil RBC (0.43 ppm) and maximum background concentrations (4.89 ppm surface soil and 5.4 ppm subsurface soil) in most of the surface and subsurface soil samples. Lead was detected in a surface soil sample at the discharge point of the grit chamber at a concentration of 1,200 ppm, which is three times the USEPA screening level of 400 ppm for lead in residential soils. The maximum TPH concentration detected was 2,310 ppm, which is significantly higher than the State's TPH soil action level of 100 ppm for UST sites, in the surface soil sample collected at the discharge point of the grit chamber. TPH (737 ppm) was also detected above the State's TPH soil action level for UST sites in the surface soil at the service bay spill run-off area immediately off the parking pad. However, TPH did not exceed the State's TPH soil action level for UST sites downhill from the grit chamber, further along the spill run-off pathway, or in subsurface soils, indicating small localized areas of contamination. Other than arsenic, none of the analytes were found to exceed their associated screening levels in the subsurface soil samples.

4.5 AREE 29-4 — Disposal Area

The Disposal Area is located near the northeast corner of VHFS, northwest of the Skeet Range (AREE 14). Review of aerial photographs of this area provided evidence of disposal activities as early as 1958. These signs were visible to various extents as late as 1977. A total of five distinct areas were located within the Disposal Area, based on ground stains and debris visible in aerial photographs. Two areas were used for construction debris disposal and are now enclosed within groves of trees. Another area is an approximately 30-foot wide man-made depression in the ground where water collects after rain events. It is not known whether the area was used to obtain fill material or for liquid disposal. The last two sites appeared as orange-stained areas in historic aerial photographs. These are both currently level and covered with grass. It is not known what materials, if any, were disposed in these areas.

Surface soil samples were collected at the two construction debris piles and at the three other areas of potential contamination. Aluminum (85,000 ppm), beryllium (2.15 ppm), and iron (160,000 ppm) concentrations in surface soil in the area of the former orange mound exceeded residential soil RBCs (78,000 ppm, 0.15 ppm, and 23,000 ppm, respectively) and maximum background concentrations (20,900 ppm, 2.13 ppm, and 70,800 ppm, respectively). Benzo(a)pyrene (0.1 ppm), a polynuclear aromatic hydrocarbon (PAH), slightly exceeded its residential soil RBC (0.088 ppm) in one surface soil sample collected from the construction debris areas. Arsenic (up to 13.6 ppm) exceeded its residential soil RBC (0.43 ppm) and maximum background concentration (4.89 ppm) at the construction debris areas.

5.0 SUMMARY OF SITE RISKS

BRAs were conducted as part of the RIs to assess the human health and ecological problems that could result if the contamination at the AREEs was not remediated. The Human Health Risk Assessment (HHRA) was prepared to evaluate the magnitude of potential adverse effects on human health associated with current industrial/commercial and potential future residential exposures to site-related chemicals at the AREEs. The Ecological Risk Assessment (ERA) was conducted to characterize the potential threats to ecological receptors posed by contaminants at the AREEs.

The HHRA follows a four-step process:

- Selection of Chemicals of Potential Concern - identifies the contaminants of potential concern based on their toxicity, frequency of occurrence, and concentration by comparing the maximum concentrations of detected chemicals with RBCs which are health-protective chemical concentrations that are back-calculated using toxicity criteria, a 1×10^{-6} target carcinogenic risk or a 0.1 hazard quotient (HQ, defined below), and conservative exposure parameters;
- Exposure Assessment - identifies the potential pathways of exposure, and estimates the concentrations of contaminants to which people may be exposed as well as the frequency and duration of these exposures;
- Toxicity Assessment - determines the toxic effects of the contaminants, and
- Risk Characterization - provides a quantitative assessment of the overall current and future risk to people from site contaminants based on the exposure and toxicity information.

The HHRA evaluated health effects which could result from exposure to soil, groundwater, surface water, and sediment contamination in the Phase I and Phase II reuse areas of VHFS. The HHRA evaluated potential risks to current workers who could be exposed to contaminants in surface soil, and to current trespassers who could be exposed to contamination in surface soil, surface water, and sediment. In addition, the HHRA evaluated potential risks to hypothetical future adult residents who could be exposed to contaminants in groundwater and surface soil and to hypothetical future child residents who could be exposed to contaminants in groundwater surface soil, surface water, and sediment. Potential risks to future excavation workers who could be exposed to contaminants in subsurface soil were also evaluated in the HHRA. Subsurface soil was only evaluated for excavation workers and not residents since residents would be unlikely to be exposed to subsurface soil. In addition, the concentrations of contaminants currently present in subsurface soil would not be representative of the concentrations that might be present if landscaping activities were to occur which would involve mixing of subsurface soils with surface soil, clean topsoil, and other soil amendments. Therefore, it would not be appropriate to evaluate risks to residents using available subsurface soil data.

Potential carcinogenic (cancer-related) effects and noncarcinogenic effects (including various impacts on different organ systems, such as lungs, liver, etc.) were evaluated in the HHRA. Carcinogenic effects are

expressed as the probability that an individual will develop cancer from exposure to the contaminants from each AREE. The evaluation of noncarcinogenic effects is based on the hazard index (HI), which is the summation of the HQs for individual chemicals. The HQ is a comparison of chemical-specific chronic exposure doses with the corresponding protective doses derived from health criteria. The USEPA recommends that remedial actions may be warranted at sites where the carcinogenic risk to any person is greater than 1×10^{-4} or the HI is greater than 1. A carcinogenic risk of 1×10^{-4} means that there is a potential of one additional person in a population of 10,000 developing cancer from exposure to contaminants at an AREE if the AREE is not remediated. A HI greater than 1 indicates a potential for noncarcinogenic health effects if the AREE is not remediated.

The ERA also follows a four-step process:

- Problem Formulation - develops information that characterizes habitats and potentially exposed species and identifies contaminants of concern, exposure pathways, and receptors.
- Exposure Assessment - estimates exposure point concentrations for selected indicator species
- Ecotoxicologic Effects Assessment - identifies concentrations or doses of contaminants that are protective of indicator species; and
- Risk Characterization - estimates potential adverse effects from exposure to contaminants based on exposure and toxicity information.

The ERA evaluated ecological effects which could result from exposure to surface soil, surface water, and sediment contamination in the Phase I and Phase II reuse areas of VHFS. The ERA evaluated potential adverse ecological effects to terrestrial plants and terrestrial invertebrates (represented by earthworms) exposed to contaminants in surface soil. In addition, potential adverse ecological effects to mammals (represented by shrews) and birds (represented by robins) through bioaccumulation in the food web and exposure to contaminants in surface soil were evaluated. Potential adverse ecological effects to aquatic life from exposure to contaminants in surface water and sediment were also evaluated in the ERA.

The evaluation of significant potential adverse ecological effects is based on the Environmental Effects Quotient (EEQ). The EEQ is the ratio of the estimated exposure concentrations/doses for the chemicals of potential concern and the toxicity reference values (TRVs) for the ecological receptors. If the EEQ is greater than 1, there is a potential for adverse ecological effects to occur. As the magnitude of the EEQ becomes greater than 1, the potential for adverse ecological effects becomes more significant.

The results of the BRAs for the five AREEs are presented in the following paragraphs. A detailed presentation of the BRAs can be found in the Phase I Reuse Area RI Report (USAEC, 1998) and the Phase II Reuse Area RI Report (USACE, 1999), available in the Information Repository.

5.1 AREE 13 - Sludge Disposal Area

The HHRA determined that site-related contamination at AREE 13 does not pose an unacceptable human health risk under either current industrial/commercial or potential future residential land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated excess lifetime cancer risk (8×10^{-6}) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risk ($HI = 10$) is for child residents exposed to contaminants in surface soil by incidental ingestion. The contaminant that drove the elevated HI at AREE 13 is iron. When site and background iron concentrations were statistically compared iron was not determined to be within background concentrations and, therefore, was not discounted. However, iron was detected at comparable levels in similar subsurface soil types in background locations and is therefore, determined to be naturally-occurring and not site-related. An ERA was not conducted at AREE 13

because all samples were collected at depths of greater than 6 inches. Based on these results, no action is recommended at AREE 13.

5.2 AREE 14 – Skeet Range

The HHRA concluded that, under both current industrial/commercial and potential future residential land-use conditions, site-related contamination at AREE 14 does not pose an unacceptable human health risk, except for lead in surface soil. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk (4×10^{-6}) is for adult residents and child residents exposed to contaminants in surface soil by dermal absorption and incidental ingestion, respectively; and the highest noncarcinogenic risk (HI = 0.8) is for adult residents exposed to contaminants in surface soil by dermal absorption.

The human health risks associated with exposure to lead contamination in surface soil at AREE 14 were evaluated using the Integrated Exposure Uptake Biokinetic (IEUBK) Model recommended by USEPA for evaluating lead exposures for young children in residential settings. The IEUBK Model calculates blood lead levels which result from exposures to lead which may then be compared to blood lead levels of toxicological significance for purposes of risk evaluation. The IEUBK Model run for AREE 14 predicted a geometric mean blood lead level of 5.2 g/dL, with 7.75 percent of the population exceeding the blood lead level of concern (10 g/dL). The USEPA currently finds 5 percent of the population exceeding the blood lead level of concern acceptable. Therefore, the IEUBK Model results indicate that if AREE 14 was developed for residential use in the future, the lead concentrations in the surface soil may be a potential problem for young children.

The potential adverse effects to child residents were driven by the presence of lead above the USEPA screening level for lead in residential soil of 400 ppm at two locations in the Miss Zone. The extent of lead contamination in the two locations that drove unacceptable human health risks was further investigated during the SRI. Soil in those two locations was excavated and disposed off site, and the sample results from the remaining soil show that lead concentrations do not exceed the USEPA screening level for lead in residential soil. Thus, no action is recommended at AREE 14 because the unacceptably high lead concentrations were removed during the SRI. A detailed presentation of the investigation of lead hot spots at AREE 14 can be found in the SRI Report, available in the Information Repository

The ERA determined that surface soil at AREE 14 does not pose significant potential adverse ecological effects.

Based on these results, no action is recommended for AREE 14.

5.3 AREE 16-1 – Possible Firefighter Training Pit

Results of the HHRA indicate that, under both current industrial/commercial and potential future residential land-use conditions, the risks to workers, trespassers, and residents are acceptable for exposure to site-related contaminants (i.e., arsenic and 2,3,7,8-TCDD) in surface soil. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk (9×10^{-5}) is for adult residents and child residents exposed to site-related contaminants in surface soil by dermal absorption and incidental ingestion, respectively; and the highest noncarcinogenic risk (HI = 1) is for child residents exposed to site-related contaminants in surface soil by incidental ingestion. Although the total HI equals 1, the HIs recalculated by target organ/critical effect are all less than 1. No significant potential for adverse ecological effects were found in the ERA. Based on these results, no action is recommended at AREE 16-1.

5.4 AREE 27 – AAFES Service Station

Results of the HHRA suggested that site-related contamination at AREE 27 does not pose an unacceptable human health risk under either current industrial/commercial or potential future residential land use conditions. Discounting naturally-occurring metals that were statistically determined to be with background levels the highest estimated upper-bound excess lifetime cancer risk (7×10^{-5}) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk ($HI = 2$) is for child residents exposed to site-related contaminants in surface soil by dermal absorption. When recalculated by target organ/critical effect, the HI equals 1.3 for the kidneys, primarily as a result of exposures to chromium in surface soil at AREE 27. Although not all chromium present at AREE 27 will be hexavalent chromium (i.e., the most toxic form of chromium), the conservative toxicity criterion for hexavalent chromium was used in the HHRA. Therefore, a HI of 1.3 calculated using conservative toxicity criteria is considered acceptable. Although arsenic exceeds its residential soil RBC, it was not a risk driver at AREE 27.

Lead contamination in surface soil at AREE 27 was evaluated using the IEUBK Model, as explained in the AREE 14 discussion, which predicted a geometric mean blood lead level of 3.2 $\mu\text{g/dL}$, with 0.77 percent of the population exceeding the blood lead level of concern (10 $\mu\text{g/dL}$). Again, the USEPA currently finds 5 percent of the population exceeding the blood lead level of concern acceptable. Therefore, the surface soil lead concentrations at AREE 27 are unlikely to have an adverse effect on the exposed child resident population.

The ERA determined that site-related contaminants at AREE 27 posed no significant potential for adverse ecological effects.

Based on these results, no action is recommended at AREE 27.

5.5 AREE 29-4 – Disposal Area

The HHRA determined that site-related contamination at AREE 29-4 does not pose an unacceptable human health risk under either current industrial/commercial or potential future residential land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk (3×10^{-5}) is for child residents exposed to contaminants (i.e., benzo[a]pyrene and aluminum) in surface soil by incidental ingestion, and the highest noncarcinogenic risk ($HI = 1$) is for child residents exposed to site-related contaminants in surface soil by incidental ingestion. The ERA concluded that significant potential adverse ecological effects are not posed by the site-related contaminants at AREE 29-4. Based on these results, no action is recommended at AREE 29-4.

6.0 SELECTED ALTERNATIVE

No action is selected by the U.S. Army for AREEs 13, 14, 16-1, 27, and 29-4 because these sites do not pose unacceptable human health or ecological risks. USEPA and the Virginia Department of Environmental Quality (VDEQ) concur with this decision. The estimated cost to implement this alternative is \$0.

7.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The Proposed Plan for AREEs 13, 14, 16-1, 27, and 29-4 was released to the public on or about March 31, 1999 (see Attachment 3). This document was made available for public review in the Information Repository at the following location:

Fauquier County Library
Warrenton Branch - Reference Section
11 Winchester Street, Warrenton, VA
(540) 347-8750
Monday – Wednesday: 10:00 a.m. to 9:00 p.m.
Thursday – Saturday: 9:00 a.m. to 5:00 p.m.
Sunday 1:00 p.m. to 5:00 p.m.

The notice of availability of the Proposed Plan (see Attachment 4) was published in The Fauquier Citizen, the Fauquier Times-Democrat, and the Manassas Journal Messenger during the week of March 29, 1999. A public comment period was held from April 1, 1999, through April 30, 1999. In addition, a public meeting was held on April 15, 1999, to present the Proposed Plan for AREEs 13, 14, 16-1, 27, and 29-4 and to answer questions and receive public comments. The public meeting minutes have been transcribed, and a copy of the transcript is available to the public at the aforementioned location. A Responsiveness Summary, included as part of this Decision Document (DD), has been prepared to respond to the significant comments, criticisms, and new relevant information received during the comment period. Upon signing the DD, the U.S. Army will publish a notice of availability of this DD in The Fauquier Citizen, the Fauquier Times-Democrat, and the Manassas Journal Messenger, and place the DD in the Information Repository.

8.0 RESPONSIVENESS SUMMARY

The purpose of this Responsiveness Summary is to provide the public with a summary of citizen comments, concerns, and questions about AREEs 13, 14, 16-1, 27, and 29-4. A public meeting was held on April 15, 1999, to present the Proposed Plan and to answer questions and receive comments. At the public meeting, one citizen had a question regarding the Proposed Plan. No written public comments were received during the April 1, 1999, through April 30, 1999, public comment period. Written comments, however, were received from USEPA.

The Responsiveness Summary is divided into the following sections:

- Selected newspaper notices announcing dates of the public comment period and location and time of the public meeting;
- Comments raised during the public meeting on April 15, 1999;
- Public meeting attendance roster;
- Restoration Advisory Board Members; and
- Written comments received during the public comment period.

All comments and concerns summarized in this document have been considered by the U.S. Army in making a decision regarding the selected alternative.

8.1 Selected Newspaper Notices

A public notice announcing the availability of the Proposed Plan and the public meeting was published in The Fauquier Citizen, the Fauquier Times-Democrat, and the Manassas Journal Messenger during the week of March 29, 1999. This public notice is provided in Attachment 4.

8.2 Comments Raised During the Public Meeting on April 15,1999

One citizen raised a comment during the public meeting. The citizen's question and the U. S Army's response are presented below:

CONCERNED CITIZEN: Is the chromium at AREE 27 going to present a hazard to the water source used in the pool?

ARMY RESPONSE: No, the chromium is present at very low levels that may actually be indicative of background chromium levels and thus would not impact the water source for the pool

8.3 Public Meeting Attendance Roster

The public meeting was held on April 15, 1999, at the Former Headquarters Conference Room (Building 101) at VHFS. The members of the community that attended the public meeting included Pat White Mary Noel McMullen, and William McMullen (see Attachment 5).

8.4 Active Restoration Advisory Board Members

1. Chris Kencik
2. Dean Eckelberry
3. John Mayhugh
4. Owen Bludau
5. Tim Tarr
6. Kevin Bell
7. Steve Mihalko
8. Robert Stroud
9. Joe Phelan

8.5 Written Comments Received During the Public Comment Period

No written comments were received from citizens during the public comment period. Written comments were received from USEPA during the public comment period and are provided in Attachment 6 The U. S., Army's responses to these comments are also provided in Attachment 6 and were distributed to the public during the public comment period. Most of USEPA's comments suggested wording changes or requested clarification regarding specific information. Wording changes and clarifications requested by USEPA (see Attachment 6 for details) have been incorporated into this DD.

The USEPA offered a comment regarding the appropriateness of decision-making based on the draft SRI Report. The SRI was conducted to fill data gaps identified in the RIs (e.g., the extent of contamination at AREE 14). The SRI Report does not include risk assessment All risk conclusions were made based on the RIs. Therefore, this status of the SRI Report has no impact on the no action decision made for AREEs 13,14, 16-1, 27, and 29-4.

9.0 REFERENCES

U.S. Army Corps of Engineers (USACE). 1998a. AREE 14 Investigation Summary Report. Vint Hill Farms Station. Draft Document. Prepared by ICF Kaiser Engineers, Inc. Edgewood, Maryland. June, 1998

U.S. Army Corps of Engineers (USACE). 1998b. Supplemental Remedial investigation Report. Vint Hill Farms Station. Draft Document. Prepared by ICF Kaiser Engineers, Inc. Edgewood, Maryland. November 1998.

U.S. Army Corps of Engineers (USACE). 1999. Remedial Investigation Report. Vint Hill Farms Station Phase II Reuse Area Remedial Investigation. Final Document. Prepared by ICF Kaiser Engineers, Inc. Edgewood, Maryland. January, 1999.

U S. Army Environmental Center (USAEC). 1996. Site Inspection Report with Supplemental Hydrogeologic Investigation. Vint Hill Farms Station, Warrenton, Virginia. Final Document. Prepared by Science Applications International Corporation, McLean, Virginia. June, 1996.

U.S., Army Environmental Center (USAEC). 1998. Remedial Investigation Report. Vint Hill Farms Station Phase I Reuse Area Remedial Investigation/Feasibility Study. Final Document. Prepared by ICF Kaiser Engineers, Inc. Edgewood, Maryland. April, 1998.

ATTACHMENT 1

**RESPONSE TO USEPA COMMENTS ON THE
FINAL PHASE I REUSE AREA RI REPORT**

**Response to Comments on the
Final Phase I Reuse Area RI Report, Vint Hill Farms Station
from USEPA Region III**

RESOLUTION OF PREVIOUS COMMENTS

Comment:

Comment: Regarding data validation, please explain why no J, K, or L qualifiers appear on any of the data. Since there was a discrepancy between the IRDMIS database and the SI report for a few values, please indicate the method used when determining accurate results for AREE 11.

Response: Since the data qualifiers had to be hand entered, only the qualifiers that affect the risk assessment and, therefore, the conclusions of the Phase I Reuse Area RI Report were entered into the database and presented in the report.

Since the Site Inspection (SI) Report was supposedly prepared using the IRDMIS database, the IRDMIS database information was used when a discrepancy was found between the IRDMIS database and the SI Report.

IMPACT OF NEW TOXICITY FACTORS ON RISK AT PHASE I

NOTE: The complete text of USEPA's comments including point-by-point impacts of the toxicity factor changes are provided in Attachment 1 to these responses. USEPA's comments are summarized herein to focus attention on the overall conclusions made by USEPA regarding the impact of the toxicity factor changes on the Final Phase I Reuse Area RI Report recommendations.

Comment 1.

Comment: Toxicity factors for some chemicals have changed since April, when this report was submitted. In most cases, the changes would not alter the outcome of the risk assessment. However, in a few cases, the impacts on risk-management decisions could be significant. As we discussed during our conference call on December 2, 1998, in cases where toxicity factors could possibly change risk decisions a technical memo will be developed that rationalizes no further action decisions at selected AREES. This technical memo should include rationalizations for AREES 12, 13, 16-1, 27, 29-4 and groundwater wells that reveal high levels of bis(2-ethylhexyl)phthalate (BEHP).

- a) For AREE 12 subsurface soil, future residential risks did exceed $1E-4$ due to benzo[a]pyrene.
- b) For AREE 13, aluminum, iron, and possibly vanadium also contributed.
- c) For AREE 16-1 surface soil, risks did exceed NCP targets, due to arsenic, TCDD, and chromium. The concentrations of arsenic and TCDD at AREE 16-1 pose a total cancer risk of $2E-4$ for the child/adult scenario. Chromium is a possible driver of an HI above 1.

- d) For AREE 27, chromium and cadmium contribute to an HI above 1.
- e) For AREE 29-4 surface soil, the aluminum HI of 1.4 was borderline.
- f) For site-wide groundwater, the BEHP is a potential concern. Although phthalates are common laboratory contaminants, BEHP was detected in several wells at high levels that were not attributed to blank contamination. On the other hand, the presence of BEHP in background wells at similar levels implies that there may be a regional BEHP issue. As a base-closure issue, the groundwater BEHP could be important, since it exceeds both NCP target risks and the MCL.

Response: The U.S. Army appreciates USEPA's assessment of risks for the Phase I reuse area based on the recent toxicity factor changes. However, for the record, the U.S. Army cannot agree with the details of USEPA's assessment and the risk numbers presented without conducting the assessment itself. Reassessment of risks is not productive since the report is final based on the toxicity factors valid at the time the report was finalized and requested by USEPA in its comments on the Draft Phase I Reuse Area RI Report. Therefore, rather than addressing the specific numbers presented in USEPA's comments, the goal of these responses is to address the major conclusions made by USEPA during its assessment of the toxicity factor changes.

It is important to note that the toxicity factors used in USEPA's assessment were not available at the time the Phase I Reuse Area RI Report was being finalized and the remediation decisions were being made. Rather, the Phase I Reuse Area RI Report was prepared, and the remediation decisions made, based on the toxicity factors that were valid at the time (i.e., toxicity factors published in October, 1997). However, in light of the recent toxicity factor changes, the U.S. Army still believes that the no further action conclusions made in the Final Phase I Reuse Area RI Report are protective for the five AREEs identified in USEPA's comments and site-wide groundwater as discussed in the following paragraphs.

- a) For AREE 12 (Dump #2) subsurface soil, the no further action decision is protective for two reasons. First, USEPA has previously established a policy position that only industrial exposures (i.e., construction workers) be considered when evaluating soils below 2 ft below ground surface (bgs). Therefore, the observation made by the USEPA toxicologist that the recently published toxicity factor changes cause future residential risks from exposure to subsurface soil at AREE 12 to exceed $1E-4$ due to benz[a]pyrene is not relevant. Construction worker exposures remain below the target risk levels even in light of the recent toxicity factor changes. Second, it is important to note that AREE 12 is a permitted construction debris landfill, and the U.S. Army intends to institute deed restrictions which will prevent exposure to subsurface soil.
- b) For AREE 13 (Sludge Disposal Area), USEPA identified aluminum, iron, and possibly vanadium as compounds that contribute to elevated non-carcinogenic risk. As discussed in Section 8 of the Final Phase I Reuse Area RI Report, the soil samples from AREE 13 were collected from 1-3 ft bgs which straddles the surface/subsurface soil boundary (i.e., 2 ft bgs). To be conservative, these samples were evaluated as surface soil samples in the Human Health Risk Assessment (HHRA) and thus were statistically compared to surface soil background results which are based on samples collected from 0-0.5 ft bgs. However, a more appropriate comparison can be made using the background

subsurface soil sample results since surface soil was likely removed along with the sludge in 1992. Iron concentrations in background subsurface soil samples are highly variable, ranging from 9,360 µg/g to 180,000 µg/g. Aluminum concentrations in background subsurface soil samples range from 4,410 µg/g to 60,600 µg/g, and vanadium concentrations in background subsurface soil samples range from 44.3 µg/g to 531 µg/g. The variability of iron, aluminum, and vanadium concentrations in the background subsurface soil samples is most likely due to the variability of soils that were sampled. The composition of soil is primarily controlled by the composition of the bedrock from which it is formed. Figure 2-1 of the Final Phase I Reuse Area RI Report shows the geology of shallow bedrock across VHFS. For example, the background subsurface soils which have the highest iron concentrations (SB-BK-002 [91,000 µg/g at 3 ft bgs] and SB-BK-003 [180,000 µg/g at 5 ft bgs and 100,000 µg/g at 18.5 ft bgs]) are located in areas where intrusions of mafic material (i.e., basalt) have occurred. Mafic rocks are rich in iron and magnesium and will produce soils that are rich in iron and magnesium. Iron concentrations in soil at AREE 13 range from 75,200 µg/g to 230,000 µg/g. According to the Environmental Contamination Survey (USATHAMA, 1986), a mafic intrusion (Hickory Grove Basalt) bisects AREE 13, and the sludge disposal area lies over the geological contact area of the Catharpin Creek Member and the Hickory Grove Basalt. The high iron concentrations are most likely a product of the parent material from which the soil in this area is derived. In addition, it should be noted that the aluminum and vanadium concentrations at AREE 13 (53,300 µg/g to 73,100 µg/g for aluminum, and 221 µg/g to 317 µg/g for vanadium) are more comparable to the subsurface soil background ranges than they are to the surface soil background ranges. Furthermore and more importantly, aluminum, iron, and vanadium are not anticipated to be present in environmental media at AREE 13 based on site history. Other metals (e.g., silver, cadmium, lead, and mercury) which are more likely to be site-related contaminants based on site history were either not detected or were detected at concentrations below screening levels. Therefore, aluminum, iron, and vanadium are not site-related contaminants but rather are representative of background concentrations in soil derived from the type of bedrock present at AREE 13. No further action is a protective recommendation for AREE 1.3.

- c) For AREE 16-1 (Possible Firefighter Training Pit) surface soil, USEPA found that the concentrations of arsenic and TCDD pose a total cancer risk of 2E-4 for the child/adult scenario. Even when ingestion and dermal absorption exposure routes are added as was done by USEPA, the cancer risk is borderline compared to the target risk of 1 E-4. Based on the borderline cancer risk associated with arsenic and TCDD, the small size of the firefighter training pit (i.e., 50 ft diameter for one of the possible pits which was most likely AREE 16-2 based on terrain) for which typical exposure assumptions are exaggerated, and the uncertainty that AREE 16-1 truly represents a former firefighter training pit, no further action at AREE 16-1 is protective.

USEPA also found that chromium is a possible driver of a HI above 1 given the recently lowered (i.e., more stringent) toxicity factor for hexavalent chromium. It should be noted that there is a great deal of conservatism built into the calculation of the HI for chromium in surface soil at AREE 16-1 for the following reasons: 1) the HHRA is based on the conservative assumption that all chromium present at

AREE 16-1 is hexavalent chromium which is not supported by site history; and 2) the oral RfD for hexavalent chromium has an uncertainty factor of 900, which indicates high uncertainty associated with the RfD. Hexavalent chromium is typically found in the environment as a result of contamination from electroplating or conversion coating operations where hexavalent chromium is used in the process solutions. The residential soil risk-based concentration (RBC) for trivalent chromium, the form of chromium more commonly found in the environment when electroplating and conversion coating operations are not involved, is three orders of magnitude higher (i.e., less stringent) than the corresponding RBC for hexavalent chromium (i.e., $1.2\text{E}5$ $\mu\text{g/g}$ versus $2.3\text{E}2$ $\mu\text{g/g}$). In the case of AREE 16-1, which was a possible firefighter training pit, operations that used hexavalent chromium were not conducted. In fact, operations using chromium in any form were not conducted.

In addition, although chromium at AREE 16-1 was not statistically within background, the data do not suggest widespread chromium contamination that would be present if the contamination was site-related. Four surface soil samples were collected at AREE 16-1 and yielded chromium at concentrations ranging from 27.2 $\mu\text{g/g}$ to 59.9 $\mu\text{g/g}$, with an arithmetic mean concentration of 41.0 $\mu\text{g/g}$. Background concentrations in surface soil were detected at concentrations as high as 60 $\mu\text{g/g}$. A common sense review of the data in light of site history indicates that it is reasonable to find the chromium concentrations to be representative of background concentrations.

Based on the conservatism of the HI calculation for chromium, the lack of site history involving chromium, and the fact that the detected chromium levels are potential background levels, the no further action decision for AREE 16-1 is protective.

- d) For AREE 27 (AAFES Service Station) surface soil, although cadmium and chromium both contribute to a HI above 1, chromium is the risk driver because of the recently lowered (i.e., more stringent) toxicity factor for hexavalent chromium. Therefore, this response focuses on chromium. As discussed in Section 8 of the Final Phase I Reuse Area RI Report, there is a great deal of conservatism built into the calculation of the HI for chromium in surface soil at AREE 27 for the following reasons: 1) the HHRA is based on the conservative assumption that all chromium present at AREE 27 is hexavalent chromium which is not supported by site history; and 2) the oral RfD for hexavalent chromium has an uncertainty factor of 900, which indicates high uncertainty associated with the RfD. Hexavalent chromium is typically found in the environment as a result of contamination from electroplating or conversion coating operations where hexavalent chromium is used in the process solutions. The residential soil RBC for trivalent chromium, the form of chromium more commonly found in the environment when electroplating and conversion coating operations are not involved, is three orders of magnitude higher (i.e., less stringent) than the corresponding RBC for hexavalent chromium (i.e., $1.2\text{E}5$ $\mu\text{g/g}$ versus $2.3\text{E}2$ $\mu\text{g/g}$). In the case of AREE 27, which was a fuel and service station, operations that used hexavalent chromium were not conducted. In fact, operations using chromium in any form were not conducted.

In addition, although chromium at AREE 27 was not statistically within background, the data do not suggest widespread chromium contamination that

would be present if the contamination was site-related. Nine surface soil samples were collected at AREE 27 and yielded chromium at concentrations ranging from 24.8 µg/g to 75.5 µg/g, with an arithmetic mean concentration of 40.6 µg/g. Background concentrations in surface soil were detected at concentrations as high as 60 µg/g. A common sense review of the data in light of the site history indicates that it is reasonable to find the chromium concentrations to be representative of background concentrations.

Based on the conservatism of the HI calculation for chromium, the lack of site history involving chromium, and the fact that the detected chromium levels are potential background levels, the no further action decision for AREE 27 is protective.

- e) For AREE 29-4 (Disposal Area) surface soil, USEPA calculated a HI for aluminum of 1.4 which they acknowledge is borderline. Based on the fact that the oral RfD for aluminum has an uncertainty factor of 100 and the HI is not significantly different from 1 even when ingestion and dermal absorption exposure routes are added,, no further action at AREE 29-4 is protective.
- f) For site-wide groundwater, the fact that BEHP is both a common laboratory contaminant and a common field contaminant is an important point. Although it is true that not all BEHP detections were blank qualified, the primary source of BEHP is the sampling equipment in combination with the sampling technique. BEHP is used as a plasticizer in the flexible tubing used to sample the wells. BEHP was detected in the equipment blanks prepared in the field at lower levels than was found in some of the groundwater samples primarily because of how the equipment blanks were prepared versus how the groundwater samples were collected. In the preparation of the equipment blanks, water was pumped through the sample tubing at a comparatively rapid rate which did not allow for significant leaching and accumulation of BEHP in the sample. Conversely, the low-flow groundwater monitoring well sampling method involved pumping of groundwater through the sample tubing at low flow rates. Many of the monitoring wells were slow producers and required pumping at very low flow rates. The low flow of water through the sample tubing during groundwater sampling increased the opportunity for BEHP to leach into the sample and concentrate. This finding is supported by the fact that elevated BEHP was found in site wells and background wells at similar levels. Neither site nor regional history support USEPA's suggestion that the BEHP found in the groundwater samples may represent a regional issue. Groundwater samples were analyzed for a wide range of constituents, and BEHP was the only constituent that exceeded screening levels in most of the wells. If the BEHP were the result of site or regional groundwater contamination, it would have been found in combination with other contaminants rather than alone. Therefore, the conclusion that the BEHP is present as a result of field contamination is appropriate, and no further action is a protective recommendation for site-wide groundwater at VHFS.

OTHER RISK-RELATED ISSUES

Comment 1.

Comment: Cancer risks were presented separately for children and adults. In order to estimate the lifetime cancer risk when exposure includes both childhood and adulthood, the risks would be:

$(\text{Adult cancer risk} \times 24/30) + (\text{Child cancer risk})$.

Response: Remediation decisions have all been made based on separate adult and child exposures since this comment had not been made until well into the decision-making process (i.e., after the Final Phase I Reuse Area RI Report was submitted). Furthermore, this methodology is consistent with that used in other HHRAS performed for and accepted USEPA Region III.

Comment 2.

Comment: The soil-to-skin adherence factors are generally reported at lower levels in the new Exposure Factors Handbook than previously (Section 7.1.2.3; Tables 7-16, 7-17, 7-19, 7-24). Therefore, it is possible that dermal soil risks are overestimated in this respect.

Response: The uncertainty associated with the soil-to-skin adherence factors and their impact on risk estimates is already discussed in the Uncertainty Section of the Final Phase I Reuse Area RI Report.

ATTACHMENT 1

DETAILED COMMENTS FROM USEPA REGARDING NEW TOXICITY FACTORS

IMPACT OF NEW TOXICITY FACTORS ON RISK AT PHASE I

Toxicity factors for some chemicals have changed since April, when this report was submitted. In most cases, the changes would not alter the outcome of the risk assessment. However, in a few cases, the impacts on risk-management decisions could be significant. As we discussed during our conference call on December 2, 1998, in cases where toxicity factors could possibly change risk decisions a technical memo will be developed that rationalizes no further action decisions at selected AREEs. This technical memo should include rationalizations for AREEs 12, 13, 16-1, 27, 29-4 and groundwater wells that reveal high levels of BEHP. To assist in the facilitation of this memo, EPA has provided a table in this letter that indicates the impacts of the toxicity changes on the final estimates of risk. The toxicity-factor changes would also impact other tables and sections of the RI, on which the final risk estimates are built. For informational purposes, the changes to those "building-block," non-summary sections are included in an attachment to this letter.

1. Table 7-155 (and pages 7-62 to 7-73):

The table should not be split by route; total risks are more informative. Also, given the changes noted in the attachment, the risks on this table would be as follows:

MEDIUM/ LOCATION	WORKER CA. RISK	WORKER HI	ADULT RES. CA. RISK	ADULT RES. HI	CHILD RES. CA. RISK	CHILD RES. HI
SURFACE SOIL:						
AREE 9	--	--	--	1.9 c	--	6.5 a
AREE 11	3E-5	1.6 c	7E-5	4 a	5E-5	11
AREE 13	--	1.7 c	-	4	--	14
AREE 16-1	--	1.3	1E-4	2.7 a	1E-4	8
AREE 16-2	--	--	--	-	--	3.6 a
AREE 17	--	--	--	2 c	--	3 a
AREE 18	--	--	--	2 c	--	6 a
AREE 19	--	--	--	2.4 c	--	7
AREE 21	--	--	--	1.6 c	--	6 a
AREE 24	--	--	--	2.2 c	--	7 a
AREE 27	--	--	--	3	--	7.5
AREE 29-2	--	--	--	1.4 c	--	4.3 a
AREE 29-3	--	--	--	--	--	31. c
AREE 29-4	--	2.3 a	--	5 a	--	16
Groundwater	--	--	6E-4	8	3E-4	18

MEDIUM/ LOCATION	WORKER CA. RISK	WORKER HI	ADULT RES. CA. RISK	ADULT RES. HI	CHILD RES. CA. RISK	CHILD RES. HI
SEDIMENT:						
EASTERN	--	--	--	--	--	12 a
NORTHERN	--	--	--	--	--	10 a
WESTERN	--	--	--	--	1E-4	22
SUBSURFACE SOIL:						
AREE 12	--	1.8 c	1E-4	1.5 c	2E-4	5.1 a
Central AREES	--	1.6 c	--	2 c	--	7 a
AREE 27	--	--	—	2 a	--	6.7 a

(Footnotes have the same meaning as in the original table.)

2. The conclusions on page 7-63 should be altered slightly:
 - a) Add AREE 12 subsurface soil, benzo[a]pyrene.
 - b) Add AREE 29-4 surface soil, aluminum.
 - c) Add AREE 16-1 surface soil, arsenic, TCDD, and chromium.
 - d) To AREE 13, add aluminum and possibly vanadium.
 - e) To AREE 27, add cadmium.
3. Table 8-1:
 - a) For AREE 12, future residential risks did exceed 1E-4 due to benzo[a]pyrene.
 - b) For AREE 13, aluminum and possibly vanadium also contributed; the reason that no remediation is recommended is not clear.
 - c) For AREE 16-1, risks did exceed NCP targets, due to arsenic, TCDD, and chromium. The reason for no remediation is not clear.
 - d) For AREE 27, cadmium was also a contributor. The reason for no remediation, given the "yes" in unacceptable health risks, is not clear.
 - e) For AREE 29-4, the aluminum HI of 1.4 was borderline.
 - f) For site-wide groundwater, the bis(2-ethylhexyl)phthalate (BEHP) is a potential concern. Reported levels were not all attributed to blank contamination.
1. Section 8.1 should also include a discussion of AREE 12 subsoil, AREE 16-1 surface soil, AREE 29-4 surface soil, AREE 13 iron, aluminum, and vanadium (as elevated metals in a sludge

disposal area), and AREE 27 (for which the increase in the chromium toxicity factor has increased the HI, although the point about valence state is well taken).

5. Section 8.2 should not dismiss the BEHP lightly. Although phthalates are common laboratory contaminants, BEHP was detected in several wells at high levels that were not attributed to blank contamination. On the other hand, the presence of BEHP in background wells at similar levels implies that there may be a regional BEHP issue. As a base-closure issue, the groundwater BEHP could be important, since it exceeds both NCP target risks and the MCL.
6. Page ES-2: For AREE 12, subsoil cancer risks exceed 1×10^{-4} for potential residential exposure. For AREE 13, it is not clear that no action should be taken for metals exceeding background levels in a sludge disposal area.
7. Page ES-3:
 - a) The concentrations of arsenic and TCDD at AREE 16-1 pose a total cancer risk of 2×10^{-4} for the child/adult scenario. Chromium is a possible driver of an HI above 1. Therefore, it is not clear that no action is appropriate.
 - b) For AREE 27, chromium and cadmium contribute to an HI above 1.
8. Page ES-4:
 - a) For AREE 29-4, the aluminum HQ is 1.4.
 - b) For groundwater, further consideration should be given to the BEHP results.
 - c) For the summary bullets, antimony and arsenic should be added to AREE 19. AREE 13 (aluminum, iron, and possibly vanadium) should be added. AREE 16-1 (arsenic, TCDD and chromium) should be added. AREE 29-4 (aluminum) and AREE 12 subsurface soil (benzo[a]pyrene) may warrant inclusion. Groundwater BEHP should receive further consideration. AREE 27 (cadmium and chromium) may warrant inclusion.

OTHER RISK-RELATED ISSUES

9. Cancer risks were presented separately for children and adults. In order to estimate the lifetime cancer risk when exposure includes both childhood and adulthood, the risks would be:

$(\text{Adult cancer risk} \times 24/30) + (\text{Child cancer risk})$.

10. Appendix F: This appendix generates residential risks, but uses industrial RBCs to screen. If residential RBCs were used, then additional COPCs (with their EPCs shown here) would be identified:

AREE 12: aluminum (16100 mg/kg), chromium (24.7 mg/kg), iron (40400 mg/kg), manganese (605 mg/kg), vanadium (95 mg/kg)

Central AREEs: aluminum (18900 mg/kg), antimony (0.27 mg/kg), cadmium (0.4 mg/kg), chromium (27 mg/kg), manganese (2390 mg/kg), silver (0.44 mg/kg), vanadium (110 mg/kg)

AREE 27: aluminum (15000 mg/kg), arsenic (12.2 mg/kg), chromium (46 mg/kg), iron (48000 mg/kg), manganese (950 mg/kg), vanadium (116 mg/kg)

For AREE 12, the residential cancer risks exceed $1E-4$ due to benzo[a]pyrene: For all other residential subsoil scenarios, the cancer risks are below $1E-4$ and the HIs are at or below 1 after background attribution and target organ separation.

11. The soil-to-skin adherence factors are generally reported at lower levels in the new Exposure Factors Handbook than previously (Section 7.1.2.3; Tables 7-16, 7-17, 7-19, 7-24). Therefore, it is possible that dermal soil risks are overestimated in this respect.

ATTACHMENT: DETAILS ON RISK ASSESSMENT SECTIONS IMPACTED BY NEW TOXICITY FACTORS

1. Tables 4-2 and F-1: Screening RBCs for beryllium, chromium, vinyl acetate, 1,3-dichlorobenzene, 2-chloronaphthalene, bis(2-chloroethyl) ether, dibenzofuran, 2-methylnaphthalene, naphthalene, the chlordanes, toxaphene, dinoseb, and Aroclor 1016 have been updated. As will be seen, only the differences for beryllium, chromium, and chlordane are generally significant for Vint Hill. The 1,2,3,7,8-PeCDF RBCs were incorrect on this table. However, since the correct numbers were used elsewhere in the report, this is not a major issue.
2. Beryllium's RBC would be higher and it would no longer be a COPC, and chromium's RBC would be lower but its COPC status would not change, on Tables 4-3 through 4-6, Tables 5-2 through 5-9, Table 5-10 (chromium only), Table 5-11, Table 5-12, Tables 5-15 through 5-23, Tables 5-25 through 5-30, Tables 5-33 through 5-43, Table 5-45, Table 6-1, Table 7-2, and in Sections 4.2.1, 4.2.2, 4.2.3, 5.1.2, 5.1.4, 5.2.2, 5.2.4, 5.2.5, 5.3.2.1, 5.3.2.2, 5.3.4.1, 5.3.4.2, 5.4.4, 5.5.1, 5.7.4.2, 5.7.5.2, 5.8.4.1, 5.8.4.2, 5.9.2, 5.9.4, 5.10.4.1, 5.10.4.2, 5.10.5, 5.11.2, 5.11.3, 5.12.1, 5.14.2, 5.14.4, 5.15.4, 5.16.2, 5.17.4, 5.18.2, 5.18.4, 5.18.5, 5.19.2, 5.19.4, 5.19.5, 6.4.1.1, 6.4.2.1, and 7.1.1.4; also on page 7-6, 3rd paragraph.

2-Methylnaphthalene's RBC would be lower, but its COPC status would not change, on Tables 5-2, 5-9, 5-19, 5-35, 5-41, 5-45, and 7-2, and in Sections 5.1.2, 5.3.4.1, 5.3.4.2, 5.8.4.1, 5.14.4, 5.18.4, 5.18.5, 5.19.4, and 5.19.5.

Chlordane's RBC would be higher, but its COPC status would not change, on Tables 5-7, 5-11, 5-20, and 5-43, and in Sections 5.3.2.1, 5.3.2.2, 5.4.4, 5.8.4.2, 5.19.2, and 5.19.5. The COPC status of total chlordane would not change on Tables 5-8 and 5-9, and in Sections 5.3.4.1 and 5.3.4.2. Chlordane would no longer be a COPC on Table 5-19 and in Section 5.8.4.1.

Naphthalene's RBC would be lower, but its COPC status would not change, on Tables 5-8, 5-9, 5-11, 5-19, 5-41, 5-42, 5-45, and 7-2, and in Sections 5.3.4.1, 5.3.4.2, 5.4.4, 5.8.4.1, 5.18.4, 5.18.5, 5.19.4, and 5.19.5.
3. On Tables 7-4 and 7-11 (also pp. 7-7 through 7-10), the COPC selections would change as follows:

AREEs 9, 13, 19, 21, 24, 29-2, 29-3: beryllium no, chromium yes;

AREEs 11, 16-1, 16-2, 18, 27, 29-4: beryllium no;

AREE 17: chlordane no, beryllium no, chromium yes.
4. On Tables 7-6 and 7-11 (also on p. 7-12), the COPC selections for occupational use would change as follows: Central AREEs: beryllium no.
5. On Tables 7-8 and 7-11 (also on p. 7-12), the COPC selections would change as follows: chlordane no.
6. On Tables 7-10 and 7-11 (also on pp. 7-13 and 7-14), the COPC selections would change as follows:

Eastern: beryllium no;

Northern: beryllium no, chromium yes;

Western: alpha-chlordane no, gamma-chlordane no, beryllium no.

7. Table 7-14:

Beryllium does not need to be a COPC for groundwater, surface soil AREE 9, surface soil AREE 11, surface soil AREE 13, surface soil AREE 16-1, surface soil AREE 16-2, surface soil AREE 17, surface soil AREE 18, surface soil AREE 19, surface soil AREE 21, surface soil AREE 24, surface soil AREE 27, surface soil AREE 29-2, surface soil AREE 29-3, surface soil AREE 29-4 subsurface soil central AREES, eastern tributary sediment, northern tributary sediment, and western tributary sediment.

Chlordane does not need to be a COPC in AREE 17 surface soil or western tributary surface water. Alpha- and gamma-chlordane do not need to be COPCs in western tributary sediment.

Surface soil, AREE 9: The manganese EPC should be 2980 mg/kg, but this transcription error is negligible in terms of risk. Chromium should be added, with an EPC of 32.5 mg/kg.

Surface soil, AREE 13: Chromium should be added, with an EPC of 28.9 mg/kg.

Surface soil, AREE 17: Chromium should be added, with an EPC of 35 mg/kg.

Surface soil, AREE 19: Chromium should be added, with an EPC of 23 mg/kg.

Surface soil, AREE 21: Chromium should be added, with an EPC of 20 mg/kg.

Surface soil, AREE 24: Chromium should be added, with an EPC of 33.6 mg/kg.

Surface soil, AREE 29-2: Chromium should be added, with an EPC of 36.6 mg/kg.

Surface soil, AREE 29-3: The iron EPC should be 26000 mg/kg, but this transcription error is negligible. Chromium should be added, with an EPC of 24 mg/kg.

Subsurface soil, AREE 12: The EPCs should be 13 mg/kg for benz[a]anthracene, 13 mg/kg for benzo[a]pyrene, 16 mg/kg for benzo[b]fluoranthene, 3.8 mg/kg for dibenz[a,h]anthracene, and 9.5 for indeno[1,2,3-c,d]pyrene. However, these changes are negligible in terms of risk.

8. Table 7-25:

The new oral slope factors for the chlordanes are all 0.35 per mg/kg/day; the new oral RfDs are 5E-4 mg/kg/day.

The 1,2-dichloroethane target organs include the stomach and thymus.

The barium target organs include the kidney.

The new beryllium oral RfD is 2E-3 mg/kg/day with the intestines as the target organ; the oral slope factor has been withdrawn.

The new chromium oral RfD is 3E-3 mg/kg/day.

The inorganic mercury target organ is the immune system.

9. Table 7-26:

The new unit risk for chlordane is 1E-4 per ug/m³; the new RfC is 7E-4 mg/m³.

The 1,2-dichloroethane target organs include possible kidney effects.

The provisional aluminum RfC is 3.5E-3 mg/m³

The new beryllium RfC is 2E-5 mg/m³.

The new chromium RfC is 1E-4 mg/m³.

10. Table 7-27: As noted elsewhere in the report, adjusted slope factors are not calculated for the carcinogenic PAHs. The beryllium, chromium, and chlordane dermal numbers would change in accordance with their new oral numbers.

11. The risk drivers for AREE 9 surface soil would be iron, manganese, chromium, and vanadium, which are all similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 11 surface soil would be chromium, vanadium, mercury, iron, and chlordane, of which mercury and chlordane exceed background levels.

The risk drivers for AREE 13 surface soil would be aluminum, iron, chromium, and vanadium, of which only chromium is similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 16-1 surface soil would be arsenic, chromium, iron, manganese, vanadium, and TCDD, of which arsenic, TCDD, and chromium exceed background levels.

The risk drivers for AREE 16-2 surface soil would be iron and vanadium, both similar to background levels.

The risk drivers for AREE 17 surface soil would be iron, manganese, chromium, and vanadium, which are all similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 18 surface soil would be iron, manganese, and chromium, which are all similar to background levels.

The risk drivers for AREE 19 surface soil would be iron, antimony, chromium, arsenic, and vanadium, of which antimony and arsenic exceed background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 21 surface soil would be iron, manganese, chromium, and vanadium, all of which are similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 24 surface soil would be iron, manganese, chromium, and vanadium, all of which are similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 27 surface soil would be chromium, vanadium, cadmium, and iron, of which chromium and cadmium exceed background levels.

The risk drivers for AREE 29-2 surface soil would be iron and chromium, which are both similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 29-4 surface soil would be chromium, vanadium, beryllium, iron, aluminum, and manganese, of which only aluminum exceeds background levels.

The risk drivers for groundwater are manganese and bis(2-ethylhexyl)phthalate (BEHP), of which both are similar to background levels, although BEHP is not naturally occurring.

The risk drivers for western tributary sediment are arsenic, chromium, iron, manganese, and vanadium, of which arsenic exceeds background levels.

The risk drivers for eastern tributary sediment are iron, chromium, manganese, and vanadium, all of which are similar to background levels.

The risk drivers for northern tributary sediment are iron, manganese, chromium, and vanadium, all of which are similar to background levels (chromium tested with Mann-Whitney).

The risk drivers for AREE 27 subsurface soil would be chromium, iron, and vanadium, all of which are similar to background, according to a Mann-Whitney test.

The risk drivers for AREE 12 subsurface soil would be iron, chromium, vanadium, and benzo[a]pyrene, of which only benzo[a]pyrene appears to exceed background levels (metals tested with Mann-Whitney).

The risk drivers for central subsurface soil would be chromium, iron, manganese, and vanadium, all of which are similar to background (chromium, vanadium, and manganese tested with Mann-Whitney).

12. For Tables 7-28 through 7-42 and Table 7-144, along with pages 7-38 through 7-40: Chromium would be added to some of these AREEs. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would remain below 1E-4 and all HIs would remain at or below 1.
13. For Tables 7-43 through 7-72 and Table 7-145, along with pages 7-40 through 7-43: Chromium would be added to some of these AREEs. Inhalation HQs could be calculated for aluminum. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would remain below 1E-4 and all HIs would remain at or below 1, when target organs are considered and background chemicals are excluded.
14. For Tables 7-73, 7-74, and 7-146, along with page 7-43: Chromium would be added to northern tributary sediment. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would remain below 1E-4 and all HIs would remain at or below 1, when target organs are considered and background chemicals are excluded.
15. For Tables 7-75 through 7-77 and 7-147, along with pages 7-44 and 7-45: Inhalation risks for the child would increase. Risks for chromium would increase, while risks for beryllium would decrease. The dermal risks for adults are likely to be overestimated, since the amount that volatilizes during showering was not subtracted from the EPC. The total cancer risk (ingestion, dermal, and inhalation) for adults, 24-year exposure, would be 6E-4; the total HI would be 8. The total cancer risk for children (ingestion and dermal) would be 3E-4; the total HI would be 18. The risk drivers are still manganese and BEHP, with manganese attributed to background.
16. For Tables 7-78 through 7-107 and 7-148, along with pages 7-45 through 7-53: Chromium would be added to some of these AREEs. Inhalation HQs could be calculated for aluminum. Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would be less than 1E-4, and all HIs would be at or below 1 after consideration of target organs and background, except for the following:

At AREE 13, the iron HQ (ingestion + dermal) is 1.5; the vanadium HQ is 1.06, and these are potentially additive. Vanadium may not be attributable to background.

At AREE 16-1, the arsenic cancer risk is 5E-5; the TCDD cancer risk is 8E-5 (total 1E-4); the chromium HQ is 1.4. Chromium may not be attributable to background. The cancer risks on Table 7-148 should not be marked "b."

At AREE 27, the cadmium HQ is 0.21; the chromium HQ is 1.22; these are potentially additive.

17. Tables 7-108 through 7-137 and Table 7-149, along with pages 7-45 through 7-53: Chromium would be added to some of these AREEs. Inhalation HQs could be calculated for aluminum. Inhalation risks would increase due to body-weight consideration. Risks for chromium would

Increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would be less than $1E-4$, and all HIs would be at or below 1 after consideration of target organs and background, except for the following:

At AREE 11, the mercury HQ is 1.8; the chlordane HQ is 2.7. The chlordane cancer risk is $4E-5$. The cancer risk on Table 7-149 should not be attributed to background.

At AREE 13, the aluminum HQ is 1.2, the iron HQ is greater than 10; the vanadium HQ is 2.6. Vanadium may not be attributable to background.

At AREE 16-1, the arsenic cancer risk is $5E-5$; the TCDD cancer risk is $7E-5$ (total $1E-4$); the chromium HQ is 2.5. Chromium may not be attributable to background. The cancer risks on Table 7-149 should not be marked "b."

At AREE 19, the antimony HQ is 1.5; the arsenic HQ is 1.4; these are potentially additive. The HIs on Table 7-149 should not be marked "e."

At AREE 27, the cadmium HQ is 0.4; the chromium HQ is 2.2; these are potentially additive. The HIs on Table 7-149 should not be marked "b."

At AREE 29-4, the aluminum HQ is 1.4; this was not attributed to background.

18. For Tables 7-138 through 7-141 and 7-150, along with pages 7-53 and 7-54: Beryllium risks would decrease, while risks for chromium would increase. However, all cancer risks would be less than $1E-4$, and all HIs would be at or below 1 after consideration of target organs and background.

19. For Tables 7-142, 7-143, and 7-151, along with pages 7-54 and 7-55: Risks for chromium would increase, while risks for beryllium and chlordane would decrease. However, all cancer risks would be less than $1E-4$, and all HIs would be at or below 1 after consideration of target organs and background, except for the following:

For western tributary sediment, the arsenic HQ is 2.5 and the arsenic cancer risk is $9E-5$ (added to a chlordane risk of $1E-5$). The cancer risk should not be marked "c" on Table 7-151.

20. Beryllium should not be a cancer driver on Tables 7-144 through 7-151.

21. Table 7-152, Section 7.1.4.3, Section 7.1.5.4: AREE 16-1 now has the highest cancer risk, and AREE 29-4 has the highest HI. The risks on this table would change as previously noted.

ATTACHMENT 2

**RESPONSE TO USEPA COMMENTS ON THE
AREE 14 INVESTIGATION SUMMARY REPORT**

**Response to Comments on the
Draft AREE 14 Investigation Summary Report, Vint Hill Farms Station
from USEPA Region III**

Comment 1.

Comment: Section 4.1.4.4 includes a pre-excavation risk assessment. Hot spots were found and removed in the miss zone; the remaining lead in the excavated area has an average concentration of approximately 125 mg/kg. Because of the nature of the site activities, it is possible that other hot spots may be present. The contamination that was found at this site was not homogeneous, and the original source was scattered rather than issuing from an identifiable location (such as a tank, spill, transformer, etc.). Therefore, the residential risks from lead cannot be truly known unless the skeet range is systematically examined for lead, however, since the HUD guideline for lead in soil is 400 mg/kg a field screening technique may be used instead of re-sampling to ensure that all the hot spots have been removed from this AREE.

Response: It is important to note that the skeet range (AREE 14) at VHFS was only used on weekends and thus would be expected to have limited contamination as compared to a commercial skeet range. During the Site Inspection (SI), surface soil samples were collected from randomly selected grid points. During this sampling, only limited contamination was identified in the form of two hot spots. During the Supplemental Remedial Investigation (SRI), these hot spots were removed, and numerous confirmation samples were collected which yielded an average lead concentration remaining at the skeet range of 102 ppm (including all SI and SRI "left-in-place" samples). In addition, on December 10, 1998, USEPA, VDEQ, VHFS, USACE, and ICF KE personnel conducted a site walk-through of AREE 14. During this site walk-through, no lead pellets or clay pigeons were observed on the surface of the skeet range. In light of these observations, the U.S. Army stands by its conclusion that the hazard previously posed by AREE 14 has been removed and that no further sampling or action is required. It should be further noted that USEPA agreed with this no further action determination in a subsequent comment document (for the SRI) dated January 7, 1999, "... since the average concentration for lead is 125 ppm and the HUD residential guidelines is set at 400 ppm..."

ATTACHMENT 4

PUBLIC NOTICE



The United States Army
at Vint Hill Farms Station, Virginia

Invites Public Comment

ON RECENTLY PROPOSED ENVIRONMENTAL ACTIONS
FOR VINT HILL FARMS STATION, AS A RESULT
OF THE BASE CLOSURE PROCESS



• Please Come To Our •

• PUBLIC MEETING •

- Thursday, April 15, 1999 • 7:00 p.m. •
- Building 101 (Old Headquarters Bldg.), Conference Room •
- Vint Hill Farms Station, VA 20187 •

PURPOSE

TO DISCUSS AND PRESENT REMEDIAL ALTERNATIVES AND NO FURTHER ACTION PROPOSALS FOR THE SITES DISCUSSED BELOW

BACKGROUND

Vint Hill Farms Station is part of the U.S. Army Communications - Electronics Command (CECOM) and, while active, primarily functioned as an Army installation engaged in communications intelligence. VHFS is located approximately 40 miles southwest of Washington, DC, Fauquier County, Virginia. The installation occupies approximately 701 acres of land in the town of Warrenton, Virginia. Approximately 150 acres of the installation are improved grounds in the southern portion of the property used for industrial operations, administrative buildings, and residential housing. Approximately 54 acres on the eastern portion of the property are mature hardwood forest, and the majority of the remaining 457 unimproved and semi-improved acres in the northern portion of the property are used for stationary and mobile antenna operation sites. The facility was designated for closure in March 1993, under the Base Realignment and Closure (BRAC) Act.

SUMMARY

The U.S. Army, in consultation with the U.S. Environmental Protection Agency (USEPA) Region III and the Virginia Department of Environmental Quality (VDEQ), invites public comment on proposed plans for numerous sites at VHFS. Before selecting final remedies and making final no further action decisions, VHFS will consider all written and oral comments received during the public comment period of April 1 through April 30, 1999.

The U.S. Army is proposing remediation for the landfill at AREE 1 - Dump #1 and for the ash and oil found inside the AREE 20 - Incinerator Building. No further action is proposed for groundwater underlying the installation, a portion of the South Run near AREE 1 and AREE 2 Sewage Treatment Plant, and the three grassy drainage ditches.

Additionally, the U.S. Army is proposing no further action at the following Areas Requiring Environmental Evaluation (AREEs):

AREE 3	- Warehouse;	AREE 20	- Incinerator Septic Tank and Leach Field;
AREE 5	- Environmental Photographic Interpretation Center (EPIC) Building;	AREE 24	- Transformer Storage Area;
AREE 7	- Electrical Equipment Facility;	AREE 25	- Sugar Tree;
AREE 10	- Former Photographic Wastewater Lagoon;	AREE 26	- Outdoor Wash Rack;
AREE 12	- Sludge Disposal Area;	AREE 27	- AAFES Service Station;
AREE 14	- Sheet Range;	AREE 29-1	- Salvage Yard;
AREE 16-1	- Possible Firefighter Training Pit;	AREE 29-2	- Possible Sludge Disposal Area;
AREE 16-2	- Possible Firefighter Training Pit;	AREE 29-3	- Possible Disposal Area;
AREE 17	- Dump #2;	AREE 29-4	- Disposal Area;
AREE 18	- Grease Pit;	AREE 30	- Motor Pool; and
		AREE 31	- Household Debris Pits.

The U.S. Army will be accepting comments during a 30-DAY PUBLIC COMMENT PERIOD, which begins Thursday, April 15 and ends Friday, April 30, 1999.

WRITTEN COMMENTS MAY BE SUBMITTED TO THE FOLLOWING ADDRESS:

Kevin Bell, Public Affairs Officer
Vint Hill Farms Station
Building 2500, Helms Road
Warrenton, VA 20187

PROPOSAL

VHFS evaluated four remedial alternatives to address soil contamination at AREE 1:

- | | |
|---------------------------|--|
| ALTERNATIVE 1: No Action; | ALTERNATIVE 2: Excavation of Landfill; |
| ALTERNATIVE 3: Clay Cap; | ALTERNATIVE 4: Liner Cap. |

Based on available information, VHFS prefers Alternative 4, which consists of constructing a liner cap over the AREE 1 landfill and implementing land use restrictions. This remedial alternative offers adequate protection of human health and the environment, providing both short- and long-term effectiveness by: 1) removing the potential for direct contact with the contaminated soil; and 2) reducing the mobilization of contaminants in soil to other media. Due to the complexity that would be required for a treatment system to effectively treat the wide variety of contaminants present, it was not practical to consider active treatment in terms of cost-effectiveness and the ability to implement. Capping of the landfill would be done in accordance with applicable Federal and Commonwealth of Virginia regulations.

VHFS evaluated two remedial alternatives to address the incinerator building at AREE 20:

- | | |
|---------------------------|-------------------------------------|
| ALTERNATIVE 1: No Action; | ALTERNATIVE 2: Ash and Oil Removal. |
|---------------------------|-------------------------------------|

Based on available information, VHFS prefers Alternative 2, which consists of the removal of ash and oil from the incinerator and its off-site disposal at a permitted facility. This remedial alternative is a permanent solution that offers long-term effectiveness, since the contaminated materials are removed and transported off site for proper disposal. The removal and disposal of ash and oil would be done in accordance with applicable Federal and Commonwealth of Virginia regulations.

In addition, VHFS prefers no further action for AREEs 3, 5, 7, 10, 12, 13, 14, 15-1, 16-2, 17, 18, 20, 24, 25, 26, 27, 29-1, 29-2, 29-3, 29-4, 30 and 31, the groundwater underlying the installation, the South Run at AREEs 1 and 2, and three grassy drainage ditches, because these areas pose no unacceptable human health or ecological risks.

FOR MORE INFORMATION

You can review the Proposed Plan and related technical documents at the Information Repository at the following location:

Fauquier County Library
Warrenton Branch - Reference Section
11 Winchester Street
Warrenton, VA 20186
Phone (540) 347-8750

Hours: Mon - 10 a.m. - 3 p.m., Th - Sat 9 a.m. - 5 p.m., and Sun 1 p.m. - 5 p.m.

ATTACHMENT 5
PUBLIC MEETING ROSTER

Vint Hill Farms Station

Sign-In Sheet

Thursday, April 15, 1999
Public Meeting 7:00 P.M.

Recently Proposed Environmental Actions
for Vint Hill Farms Station, as a Result of
the Base Closure Process

If you wish to speak, please sign in on the lines below. Your name will be called in the order that it appears. Thank you.

NAME (Please Print)	ADDRESS (Please Print)	Received Recent Sheet(s) YES/NO	Place Name on Meeting List YES/NO
Nora Zimpf	The IT Group, Greensboro, NC	Yes	No
N. STEVEN HUFF	THE IT GROUP, EDGEWOOD, MD 2040	YES	No
FRANK SPACK	COUNTY COURT REPORTERS	Yes	NO
Wayne Phillips	VHFS - Dyr Corp	Yes	No
Joseph Phelan	COE - BALTIMORE	Yes	No
LAWRENCE SMITH	HQ, US Army Comm-Electronics Command	Yes	No
KEVIN BELL	COMETWORK FORCE - VHFS	YES	No
FRANK GRAZIANO	HQ US Army Materiel Command	Yes	No
PAT WHITE	VINT HILL EDA	yes	NO
STEVE MIHALIC	DEQ	yes	no
Bob Stroud	EPA - Region III 1650 Arch St. Phila, PA 19103	Yes	Yes

Continued on Back

Vint Hill Farms Station

Sign-In Sheet

Thursday, April 15, 1999
Public Meeting 7:00 P.M.

Recently Proposed Environmental Actions
for Vint Hill Farms Station, as a Result of
the Base Closure Process

If you wish to speak, please sign in on the lines below. Your name will be called in the order that it appears. Thank you.

NAME (Please Print)	ADDRESS (Please Print)	Received this sign sheet? YES/NO	Place Name on Mailing List? YES/NO
Mary Hoe / Mc Miller	7206 North Star Crest Dr. Warrenton, OR 97146	✓	✓
William Mc Miller	7206 - N - STARCREST DR. WARRENTON, OR	✓	✓

Continued on Back

ATTACHMENT 6

WRITTEN COMMENTS FROM REGULATORS AND U.S. ARMY RESPONSES

After mailing recent Proposed Plans to the public, the U.S. Army received comments on the Proposed Plans from the U.S. Environmental Protection Agency (USEPA) and the Virginia Department of the Environment (VDEQ). In an ongoing effort to solicit the public's input on the proposed environmental actions at Vint Hill Farms Station (VHFS), the U.S. Army is distributing our responses to comments from USEPA and VDEQ to the public. Please note that the comments that are agreed to by the U.S. Army will be incorporated into the Decision Documents for the affected sites.

Response to Comments on the Proposed Plans for Vint Hill Farms Station from USEPA Region III

AREEs 13, 14, 16-1, 27 and 29-4

Comment 1: Introduction, 1st sentence, "to address contaminated soil"

Comment: Delete "contaminated soil" so the sentence reads "alternative to address selected Areas Requiring ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 2: Page 2, Site Background, 3rd & 4th paragraphs, "currently undergoing regulatory review" and "having soil contamination which poses no unacceptable"

Comment: If the report is still being reviewed, how can we rely on a report conclusion about risk?

Response: The SRI was conducted to fill data gaps identified in the RIs (e.g., the extent of the AREE 1 landfill). The SRI does not include risk assessment. All risk conclusions were made based on the RIs.

Comment 3: Page 5, AREE 13 description, 1st paragraph, "In 1982, total metals were determined" and "In 1992, the area was closed"

Comment: (1982) By whom? Any regulator involvement? (1992) By regulator or Army decision to stop?

Response: Based on available knowledge, AREE 13 was not regulated; therefore, decisions to spread sludge and later to remove the sludge and close the disposal area were presumably made by the U.S. Army.

Comment 4: Page 6, AREE 13 description, 2nd paragraph

Comment: As part of RI?

Response: Samples at AREE 13 were collected during the SI and the RI.

Comment 5: Page 6, AREE 14 description, 2nd paragraph

Comment: Nothing in the hit zone?

Response: The lead concentrations in the Hit Zone did not exceed the USEPA screening level for lead in residential soil of 400 ppm.

Comment 6: Page 6, AREE 15-1 description, Title

Comment: Why "possible" in heading but not text?

Response: Site history indicated that a Firefighter Training Pit was used at VHFS; however, the exact location of the pit is not known with certainty. AREEs 16-1 and 16-2 represent two possible locations of the Firefighter Training Pit.

Comment: Page 5, AREE 7 description, 1st paragraph, 1th line

Comment: Discharges or discharged?

Response: Discharges.

Comment 8: Page 6, 1st full paragraph

Comment: Mentions arsenic and lead but what about chromium (see page 9)?

Response: The contaminant assessment focused on contaminants that were a potential concern by themselves, while the baseline risk assessment (BRA) evaluated contaminants in combination to determine if they were a potential concern. Chromium in combination with cadmium was identified as a potential concern for impacts to the kidneys in the BRA.

Comment 9: Page 6, AREE 29-4 description, 1st paragraph, last sentence

Comment: Should stored be disposed?

Response: Yes.

Comment 10: Page 8, AREE 13 description

Comment: Current or future potential land-use conditions ... What are these? Maybe say "current industrial/commercial use or potential future residential use conditions", or unrestricted future land use conditions.

Isn't iron naturally occurring? If so, why wasn't it discounted?

Response: Current land use conditions are based on the current usage of the VHFS property; therefore, it would be appropriate to say "current industrial/commercial use conditions". Plans for future use of the VHFS property have not yet been finalized. It was conservatively assumed that residents would inhabit the VHFS property in the future; therefore, it would be appropriate to say "potential future residential use conditions".

Yes, iron is naturally occurring. However, when AREE 13 site iron concentrations and background iron concentrations are statistically compared, iron was not determined to be within background concentrations. This is why iron was not discounted initially. As discussed in the Proposed Plan, a closer look at the subsurface soil type present at AREE 13 supports the conclusion that the iron is naturally occurring.

Comment: Page 8, AREE 14 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment: Page 8, AREE 14 description, 1th paragraph

Comment: "Soil in those ... was excavated." Removed and disposed off site?

Response: Yes, the excavated soil was removed and disposed off site.

Comment 13: Page 9, AREE 15-1 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 14: Page 9, AREE 16-1 description, 1st sentence

Comment: "contaminants" ... Are you referring to arsenic, TCDD?

Response: Yes.

Comment 15: Page 9, AREE 27 description

Comment: Current or future land-use conditions ... What are these?

Chromium not mentioned on page 6. What about arsenic?

Response: See response to Comment 10.

See response to Comment 8 regarding chromium. Arsenic was not a risk driver at AREE 27.

Comment 16: Page 9, AREE 27 description, 1st paragraph, 1st sentence

Comment: "Therefore, the HI of 1.3 ..." instead of "therefore a HI of 1.3 ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 17: Page 9, AREE 27 description, 2nd paragraph

Comment: Start the sentence from "lead contamination" and insert "explained in the AREE 14 discussion" after IEUBK Model.

Response: The U.S. Army agrees with this suggested wording change.

Comment 18: Page 9, AREE 29-1 description

Comment: Current or future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 19: Page 9, AREE 29-4 description, 4th line, "exposed" contaminants

Comment: Are you referring to aluminum, benzo(a)pyrene, beryllium, arsenic, and iron?

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. Benzo(a)pyrene and aluminum are the only two contaminants that meet these criteria.

AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33, and Site-wide Groundwater, South Run at AREEs 1 & 2, and Other Site Drainages

Comment 20: General

Comment: Is this a No Further Action or No Action Proposal?

Response: No Action.

Comment 21. Introduction, 1st sentence, "to address contamination at"

Comment: Delete "contamination at" so the sentence reads "alternative to address selected Areas Requiring..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 22. Page 2, Site Background, 3rd & 4th paragraphs, "currently undergoing regulatory review" and "having contamination which poses no unacceptable".

Comment: If the report is still being reviewed, how can we rely on a report conclusion about risk?

Response: See response to Comment 2.

Comment 23. Page 2, Site, Background

Comment: I'm concerned because we can't necessarily say that property is okay for unrestricted future use. In which case, we'll need institutional controls, a remedy. See AREE-specific comments below.

Response: See responses to AREE-specific comments below. Based on these responses, unrestricted future use is okay.

Comment 24. Page 4, AREE 3 description, 3rd sentence

Comment: "The Warehouse also may have been..." instead of "The Warehouse may have been..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 25. Page 4, AREE 3 description, 2nd paragraph

Comment: What about residential risk? Consider a scenario where the property is reused as residential and trees are planted, with the tree pits dug below 2 ft bgs. Subsurface soil could then sit at the surface and be consumed by a child.

Response: The U.S. Army's understanding of USEPA's position is that soil below 2 ft bgs only needs to satisfy target risk levels for excavation workers and not residents since residents would be unlikely to be exposed to subsurface soils. In addition, the concentrations of contaminants currently present in subsurface soil would not be representative of the concentrations that might be present if landscaping activities were to occur which would involve mixing of subsurface soils with surface soil, clean topsoil, and other soil amendments. Therefore, it would not be appropriate to evaluate risks to residents using available subsurface soil data.

Comment 26. Page 6, AREE description 1st paragraph last sentence

Comment: AREE 7 will need to be closed under RCRA by VDEQ before FOST/transfer.

Response: The U.S. Army understands the requirement for clean closure of AREE 7 by VDEQ before a final No Action decision can be made. A closure report has been submitted to VDEQ, and approval is pending.

Comment 27. Page 6, AREE 10 description, 1st paragraph, 4th sentence

Comment: How was the overflow from the lagoon discharged? Via earthen trench? Pipe?

Response: The lagoon and WSRT were connected naturally. The lagoon overflowed directly into WSRT.

Comment 28: Page 6, AREE 16-1 description, 2nd paragraph

Comment: What about sampling of the surface soil around the lagoon?

Response: The lagoon was dredged and backfilled such that any residual contamination would be present at the base of the former lagoon (i.e., 4 – 4.5 ft bgs) and not at the soil surface.

Comment 29: Page 7, AREE 16-2 description, title

Comment: Why is it the "Possible" Firefighter Training Pit?

Response: See response to Comment 6.

Comment 30: Page 7, AREE 16-2 description, 2nd paragraph, 2nd sentence, "Surface and subsurface soil"

Comment: AREE 16-1 only discusses surface soils. Was the sampling different for the two AREEs?

Response: Soil samples at AREE 16-1 could not be collected at depths below 2 ft bgs because bedrock was encountered.

Comment 31: Page 7, AREE 16-2 description, 2nd paragraph, "maximum background concentration (4.89 ppm to 5.4 ppm)"

Comment: The AREE 16-1 text doesn't give this range.

Response: A range of maximum background arsenic concentrations is given for AREE 16-2 and not AREE 16-1 because both surface soil and subsurface soil samples were collected at AREE 16-2, while only surface soil samples were collected at AREE 16-1 (see response to Comment 30).

Comment 32: Page 7, AREE 16-2 description, 2nd paragraph, last sentence

Comment: Explain how analytical results indicate that soils have not been adversely impacted? Is it because only arsenic was found and not dioxins/furans? Then where does the arsenic come from?

Response: Soils have not been impacted because arsenic was the only contaminant that exceeded screening levels at AREE 16-2, and the arsenic concentrations at AREE 16-2 were determined to be statistically within background levels.

Comment 33: Page 7, AREE 17 description, 1st paragraph

Comment: How deep is the dump? Is it unlined?

Response: Based on observations made during test pit excavation, the dump extends to depths up to 7 ft in some areas. The dump is unlined.

Comment 34: Page 7, AREE 17 description, 1st paragraph, "and small amounts of sandblasting waste containing lead paint"

Comment: Are there any elevated lead levels?

Response: No.

Comment 35: Page 7, AREE 17 description, 3rd paragraph

Comment: Is groundwater contamination a concern?

Response: No.

Comment 36. Page 9, AREE 29-1 description

Comment: Were hazardous materials stored in the "Salvage Yard"?

Response: To the U.S. Army's best knowledge, no.

Comment 37. Page 9, AREE 29-2, description

Comment: What about the sludge piles themselves?

Response: Based on review of aerial photography, there was a possibility that AREE 29-2 may have been used as a sludge disposal area. However, during sampling, there was no sludge present.

Comment 38. Page 9, AREE 29-3 description

Comment: Were hazardous materials stored at the "Possible Disposal Area"?

Response: To the U.S. Army's best knowledge, no.

Comment 39. Page 9, AREE 30 description 1st paragraph

Comment: "a petroleum odor was detected" instead of "a petroleum odor was observed".

Response: The U.S. Army agrees with this suggested wording change.

Comment 40. Page 9, AREE 30 description, 2nd paragraph last sentence

Comment: "No contamination above screening levels..." What were the screening levels?

Response: USEPA Region III risk-based concentrations (RBCs), the USEPA screening level for lead in residential soil, Virginia's TPH soil action level, and maximum background concentrations.

Comment 41. Page 9, AREE 33, description, 2nd paragraph

Comment: Industrial soil RBCs were used as the screening levels. Why not residential (subsurface) RBCs?

Response: Industrial soil RBCs were used to screen soil results at AREE 33 because the soil sample was collected from greater than 2 ft bgs (i.e., excavation workers are the most likely human receptor). Also, see response to Comment 25.

Comment 42. Page 9, Site-Wide Groundwater description, 1st sentence

Comment: "...composition of the aquifer..." Is there only one aquifer?

Response: The groundwater "aquifer" of concern at VHFS consists of groundwater in the overburden and in fractured bedrock which are interconnected (i.e., there is no defined confining unit). Therefore, it is evaluated as a single aquifer.

Comment 43. Page 11, Other/Site Drainages, 3rd paragraph, 2nd sentence

Comment: "Metals, PAHs, and pesticides were detected at concentrations above screening levels." What are the screening levels?

Response: The more stringent of the Effects Range - Lows and the No Effects Levels or Lowest Effects Levels for sediment which are protective of benthic organisms, and maximum background concentrations.

Comment 44. Page 12, 1st paragraph, 1st full sentence

Comment: "In addition, the HHRA evaluated potential risks to hypothetical future adult residents who could be exposed to contaminants in groundwater and surface soil and to hypothetical future child residents who could be exposed to contaminants in groundwater, surface soil, surface water, and sediment." What about subsurface soil?

Response: For subsurface soil, the HHRA evaluated risks to excavation workers, the human receptor most likely to be exposed to subsurface soil. Also, see response to Comment 25.

Comment 45. Page 12, AREE 3 description, 1st sentence

Comment: Current and future land-use conditions... What are these? Maybe say current industrial/commercial use or potential future residential use conditions", or unrestricted future land use conditions.

Response: See response to Comment 10.

Comment 46. Page 12, AREE 3 description

Comment: With regard to the, excavation workers, there is no mention of subsurface soil exceedance of industrial RBCs. What about residential RBCs?

Response: Although industrial soil RBCs were exceeded by contaminants in subsurface soil as indicated. on page 4, the concentrations of contaminants yielded risks lower than those for residents exposed to surface soil; therefore, only the risks for residents are presented. Also, see response to Comment 25.

Comment 47. Page 13, AREE 5 description

Comment: Is there any reason to collect surface soil samples?

Response: Only subsurface soil samples were collected because the industrial sewerline is buried at least 5 ft bgs.

Comment 48. Page 13, AREE 5 description

Comment: Risks to excavation workers are presented. What about residential exposure risks?

Response: See response to comment 25.

Comment 49. Page 13, AREE 7 description

Comment: Current and future land-use conditions... What are these?

Response: See response to Comment 10.

Comment 50. Page 13, AREE 10 description

Comment: Why were surface soil samples not collected?

Response: See response to Comment 28.

Comment 51. Page 13, AREE 10 description 1st sentence

Comment: "...so the HHRA only evaluated risks to future excavation workers." ... Then can we say that property is okay for unrestricted future use?

Response: See response to Comment 25.

Comment 52. Page 13, AREE 10 description

Comment: "No ERA was conducted at AREE 10 because all samples were collected at depths of greater than 6 inches." Depths from 0 inches to 2 feet are defined as "surface soil". Internal inconsistency created.

Response: The USEPA protocols for HHRAs and ERAs differ with respect to the definition of "surface soils" to which receptors are exposed. ERAs only use data for surface soil samples collected from the 0-6 inch depth interval, while HHRAs use data for surface soil samples collected from the 0-2 ft depth interval. The U.S. Army followed USEPA's protocols.

Comment 53. Page 13, AREE 16-2 description, Title

Comment: Why is it the "Possible" Firefighter Training Pit?

Response: See response to Comment 6.

Comment 54. Page 13, AREE 16-2 description

Comment: Current or potential future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 55. Page 13, AREE 16-2 description

Comment: What about residential risks to subsurface soil?

Response: See response to Comment 25.

Comment 56. Page 13, AREE 17 description

Comment: Current and future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 57. Page 13, AREE 17 description

Comment: What about residential risks to subsurface soil?

Response: See response to Comment 25.

Comment 58. Page 14, AREE 18 description

Comment: Current and potential future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 59. Page 14, AREE 18 description

Comment: Did the HHRA consider residential exposure to subsurface soil?

Response: See response to Comment 25.

Comment 60: Page 14, AREE 20 description

Comment: Current and future land uses ... What are these?

Response: See response to Comment 10.

Comment 61: Page 14, AREE 24 description, 1st sentence

Comment: Current and future land-use conditions ... What are these?

"... risk to workers, trespassers, and ..." should be "... risks to workers, trespassers, and ..."

Response: See response to Comment 10.

The U.S. Army agrees with this suggested wording change.

Comment 62: Page 14, AREE 24 description, 2nd sentence

Comment: "...for child residents exposed to contaminants in surface soil ..." What are these contaminants? PCBs? Metals?

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. Aluminum is the only contaminant that meet these criteria. PCBs were not detected in surface soil at AREE 24.

Comment 63: Page 14, AREE 25 description, 1st sentence

Comment: Are toxicologists satisfied that this area is okay for residential use?

Response: Based on discussions with USEPA, it is the U.S. Army's understanding that this area is okay for residential use based on the BRA findings.

Comment 64: Page 14, AREE 26 description

Comment: Current and future land uses ... What are these?

Response: See response to Comment 10.

Comment 65: Page 15, AREE 29-2 description, 1st sentence

Comment: Current and potential future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 66: Page 15, AREE 29-2 description, 2nd sentence

Comment: "...for child residents exposed to contaminants in surface soil ..." What are these contaminants?

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. Aluminum is the only contaminant that meet these criteria.

Comment 67: Page 15, AREE 29-2 description

Comment: What about the materials which were piled there?

Response: See response to Comment 37.

Comment 68. Page 15 AREE 29-3 description

Comment: Current and future land-use ... What are these?

Response: See response to Comment 10.

Comment 69. Page 15, AREE 29-3 description, 2nd sentence

Comment: "... For child residents exposed to contaminants in surface soil..." What are these contaminants? Page 9 doesn't mention surface soil, just subsurface soil.

Response: The text is referring to any contaminant identified as a chemical of potential concern that was not determined to be naturally-occurring. For AREE 29-3 surface soil, no contaminants meet this criteria. The risks presented for child residents exposed to contaminants in surface soil by dermal absorption is actually the risk associated with exposure to background metals (i.e., aluminum, arsenic, beryllium, iron, and manganese) which were only discounted if risks were found to exceed USEPA's target risk criteria.

Page 9 does not mention contamination in surface soil because none of the detected compounds exceed screening levels (i.e., residential soil RBCs and maximum background concentrations).

Comment 70. Page 15, AREE 29-3 description

Comment: "An ERA was not conducted because all soil samples were collected at depths greater than 6 inches." Are depths greater than 6 inches defined as surface or subsurface soil?

Response: See response to Comment 52.

Comment 71. Page 15, AREE 30 description

Comment: "...human health risks were only evaluated for future excavation workers." Why?

Response: See response to Comment 25.

Comment 72. Page 15, AREE 30 description

Comment: "All analytes were detected below their screening levels ..." What are the screening levels?

Response: USEPA Region III industrial soil RBCs, the USEPA screening level for lead in residential soil, and maximum background concentrations.

Comment 73. Page 15, AREE 30 description

Comment: Can't determine that AREE 30 is safe for unrestricted future use based only on human health risks for future excavation workers.

Response: See response to Comment 25. Based on this response and the findings of the BRA, it is the U.S. Army's understanding that unrestricted use of AREE 30 is okay.

Comment 74. Page 15, AREE 33 description

Comment: Why were only subsurface soil samples collected at AREE 33?

Response: The purpose of the RI at AREE 33 was to determine if the household debris present had impacted the native soils which were encountered at greater than 2 ft bgs.

Comment 75. Page 15, AREE 33 description

Comment: Why is there no information regarding residential reuse risks?

Response: See response to Comment 25.

Comment 76. Page 15, Site-Wide Groundwater description 3rd sentence

Comment: "naturally- occurring" should be "naturally-occurring"

Response: The U.S. Army agrees with this suggested wording change.

Comment 77. Page 15, Site-Wide Groundwater description

Comment: Excluding bis(2-ethylhexyl)phthalate, what are the risk and HI? What is the contaminant with the next highest risk?

Response: Excluding bis(2-ethylhexyl)phthalate along with naturally-occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk (9×10^{-6}) is for adult residents exposed to contaminants in site wide groundwater by ingestion, and the highest noncarcinogenic risk (HI=0.5) is for child residents exposed to contaminants in site-wide groundwater by ingestion. The site-related contaminants with the greatest impact on cancer risks and noncarcinogenic hazards are beryllium and barium, respectively.

Comment 78. Page 15, South Run at AREEs 1 and 2 description

Comment: Current or future land-use conditions ... What are these?

Response: See response to Comment 10.

Comment 79. Page 16, South Run at AREEs 1 and 2 description 1st paragraph

Comment: "Although the HI associated with incidental ingestion exposures to sediment in South Run at AREEs 1 and 2 by child residents exceeded 1, the exceedance was driven by metals believed to be naturally occurring." ... Why weren't the metals discounted before running the calculations?

Response: Statistical background comparisons could not be conducted for sediment sample results because of the limited number of available background samples. Therefore, all metal results were included in the calculations.

Comment 80. Page 16, South Run at AREEs 1 and 2 description, 2nd paragraph

Comment: Based on the potential for adverse effects to benthic organisms in the tributaries to South Run at AREEs 1 and 2 identified in the ERA, shouldn't an action alternative be evaluated?

Response: The ERA estimated the potential for adverse effects to benthic organisms based on the assumption that a viable habitat for benthic organisms existed. However, the habitat for benthic organisms in the tributaries to South Run at AREEs 1 and 2 is limited and, therefore, the adverse effects are over-estimated by the ERA and are actually limited. No action is warranted based on the existing conditions.

Comment 81. Page 16, Other Site-Drainages description

Comment: Current or potential future land-use conditions ... What are these?

Response: See response to Comment 10.

AREE 20

Comment 82: Page 1, Introduction, 1st sentence

Comment: Delete "contaminated materials at".

Response: The U.S. Army agrees with this suggested wording change.

Comment 83: Page 1, Introduction, 2nd sentence

Comment: "major characteristic" should be replaced with "major component".

Response: The U.S. Army agrees with this suggested wording change.

Comment 84: Page 5, AREE 20 description, 2nd paragraph, 2nd sentence

Comment: Should read "... the structure, and the Army shut down the incinerator permanently ..."

Response: The U.S. Army agrees with this suggested wording change.

Comment 85: Page 5, AREE 20 description, 2nd paragraph, 3rd sentence

Comment: Replace "... (i.e., boxes ...)" with "... (e.g., boxes ...)"

Response: The U.S. Army agrees with this suggested wording change.

Comment 86: Page 5, AREE 20 description, 4th paragraph, 3rd sentence, "should be sufficiently low"

Comment: What if it isn't?

Response: The text in the Decision Document will be revised to say "is sufficiently low" instead of "should be sufficiently low".

Comment 87: Page 5, AREE 20 description, 4th paragraph, 4th sentence

Comment: Delete "further" in "no further action".

Response: The U.S. Army agrees with this suggested wording change.

Comment 88: Page 5, AREE 20 description, 5th paragraph, 1st sentence, "the length of the incinerator"

Comment: How big is the incinerator?

Response: Approximately 45 ft long.

Comment 89: Page 5, AREE 20 description, 5th paragraph, end of second sentence, "... will require stabilization prior to disposal..."

Comment: Under which regulatory program?

Response: Stabilization to eliminate free liquids from waste materials is required by Department of Transportation (DOT) regulations and disposal facility permits.

Comment 90: Page 5, AREE 20 description, 5th paragraph, 1st sentence, "... since the 23rd requires special management..."

Comment: Under which regulatory program?

Response: Solid waste landfills in Virginia are not permitted to accept elevated dioxin/furan concentrations. Although the waste will still be managed under the Solid Waste Management Regulations, it will require special management because it will have to be disposed in a landfill that is permitted to accept elevated dioxin/furan concentrations.

Comment 91: Page 5, AREE 20, 1st sentence, 1st sentence

Comment: Replace "e.g." with "i.e."

Response: The U.S. Army agrees with this suggested wording change.

Comment 92: Page 7, Remedial Action Objective

Comment: There doesn't appear to be a risk driver; no CERCLA trigger for an action. Write this as a No Action Proposed Plan for this AREE.

Response: Per USEPA's comment, a No Action Decision Document will be written for AREE 20. The U.S. Army will remove and dispose of the ash and oil as a BRAC action rather than a CERCLA-driven action.

Comment 93: Page 7, Summary of Remedial Alternatives, Alternative 2: Ash and Oil Removal

Comment: This doesn't appear to be warranted under CERCLA. As a CERCLA ROD, no action would seem to be appropriate. The ash and oil removal seems like a separate BRAC issue.

Response: See response to Comment 92.

AREE 1

Comment 94: Page 8, Introduction, 1st sentence

Comment: Delete "contaminated soil".

Response: The U.S. Army agrees with this suggested wording change.

Comment 95: Page 8, Introduction, 2nd sentence

Comment: Replace "characteristics" with "components".

Response: The U.S. Army agrees with this suggested wording change.

Comment 96: Page 2, Site Background, 1st paragraph, 1st sentence

Comment: Delete "... and is currently undergoing regulatory review."

Response: The U.S. Army agrees with this suggested wording change.

Comment 97: Page 3, 1st sentence at top of page, "contaminants in these media were not found to pose unacceptable risk"

Comment: Under all scenarios?

Response: Yes, under all scenarios evaluated.

Comment 98: Page 9, Human Health and Ecological Risk Assessment, 1st paragraph, 1st sentence

Comment: Spell out RI.

Response: This is not necessary since RI was spelled out on page 2.

Comment 99: Page 7, AREE 1 description, 1st two sentences

Comment: What are the risk numbers for workers, trespassers, and excavation workers?

Response: The risk numbers for workers, trespassers, and excavation workers are too numerous to present individually in the Proposed Plan. However, discounting naturally-occurring metals that were statistically determined to be within background levels, the cancer risks and noncarcinogenic hazards for workers, trespassers, and excavation workers by incidental ingestion, dermal absorption, and inhalation are below USEPA's target risks of 1×10^{-4} and HI=1, respectively.

Comment 100: Page 8, 2nd full paragraph

Comment: "2,3,7,8-TCDF" ... spell out TCDF.

Response: Tetrachlorodibenzofuran.

Comment 101: Page 9, 1st paragraph, 2nd sentence

Comment: Delete "draft".

Response: The U.S. Army agrees with this suggested wording change.

Comment 102: Page 9, Alternative 3 - Clay Cap, 1st sentence

Comment: Insert "of" after construction.

Response: The U.S. Army agrees with this suggested wording change.

Comment 103: Page 9, Alternative 3 - Clay Cap, 1st sentence, "land use restrictions"

Comment: Have the type/costs and O&M been considered for land use restrictions?

Response: The type of land use restrictions considered are deed restrictions. These deed restrictions would be imposed after the cap is constructed and would limit uses of the property to activities that would not impact the integrity of the cap. For example, activities requiring excavation of the property would be prohibited. Further definition of the land use restrictions will be made once a final remedial alternative is selected, and will be included in the Decision Document for AREE 1.

The capital costs for implementing land use restrictions have been included as a line item in the FS cost estimate. The O&M cost contingency included in the FS cost estimate would cover any long-term O&M requirements for the land use restrictions.

Comment 104: Page 9, Alternative 3 - Clay Cap, 2nd paragraph concerning land use restrictions

Comment: Have these been thought out? Will the county accept zoning ordinances and permitting restrictions? What about monitoring of institutional controls? What are the permitting restrictions? What will happen during the window of the landfill cap installation and the time of transfer?

Response: Further definition of the land use restrictions will be made once a final remedial alternative is selected, and will be included in the Decision Document for AREE 1. The Decision Document text will address the issues raised by USEPA (i.e., county acceptance of zoning ordinances, permitting restrictions, and monitoring of institutional controls), as appropriate.

The landfill will not be transferred until cap construction is complete. Since the U.S. Army will maintain control over the use of the landfill property until such time as the property is transferred, land use restrictions will not be required during this time period. Since the risks associated with current industrial/commercial use were found to be acceptable,

access restrictions will not be required prior to cap construction. Access restrictions (e.g., safety fencing), however, will be maintained during cap construction to protect the public from construction hazards.

Comment 105: Page 10, Alternative 4, Liner Cap, 2nd paragraph concerning land use restrictions.

Comment: Have these been thought out? Will the county accept zoning ordinances and permitting restrictions? What about monitoring of institutional controls? What are the permitting restrictions? What will happen during the window of the landfill cap installation and the time of transfer?

Response: See response to Comment 104.

Comment 106: Page 11, Overall Protection of Human Health and the Environment.

Comment: Replace "because it removes" with "because it would remove".

Response: The U.S. Army agrees with this suggested wording change.

Comment 107: Page 11, Compliance with ARARs.

Comment: Replace "will be implemented" with "would be implemented".

Response: The U.S. Army agrees with this suggested wording change.

Comment 108: Page 11, Compliance with ARARs.

Comment: DOT and OSHA regulations are not ARARs.

Response: The U.S. Army acknowledges this comment.

Comment 109: Page 11, Compliance with ARARs: "ARARs such as solid and hazardous, if applicable) waste regulations."

Comment: Hasn't this been evaluated/determined? What about landfill design standards in the waste regulations?

Response: Based on available data, the landfill contains non-hazardous waste and, therefore, would be governed by the Solid Waste Management Regulations. The landfill capping alternatives considered were identified based on this conclusion. However, if Alternative 2 were to be selected, waste characterization samples would be required by the disposal facility. Although not anticipated, if any portion of the excavated waste was found to be hazardous, Hazardous Waste Management Regulations would apply to the affected waste.

Comment 110: Page 12, 1st partial sentence.

Comment: Change "form" to "from".

Response: The U.S. Army agrees with this suggested wording change.

Comment 111: Page 12, 1st partial sentence, and appropriate land use restrictions.

Comment: No basis given for this since no details regarding the institutional controls have been provided. What are the reuse plans in and around this area?

Response: See response to Comment 104. The reuse plans in and around this area have not yet been finalized.

Comment 112, Page 12, Implementability

Comment: No basis to evaluate implementability of institutional controls.

Response: See response to Comment 104.

Comment 113, Page 12, Cost

Comment: What about the cost of institutional control implementation and future monitoring?

Response: See response to Comment 103.

Comment 114, Page 12-13, Preferred Alternative

Comment: What about institutional controls?

Response: The preferred alternative will include land use restrictions (a.k.a., institutional controls).

**Response to Comments on the Proposed Plans for
Vint Hill Farms Station from VDEQ**

**AREEs 3, 5, 7, 10, 16-2, 17, 18, 20, 24, 25, 26, 29-1, 29-2, 29-3, 30, and 33, and Site-wide
Groundwater, South Run at AREEs 1 & 2, and Other Site Drainages**

Comment 115, AREE 7

Comment: Since AREE 7 is to be closed under RCRA, clean closure must be approved by the Department's Office of Waste Permitting before a no further action alternative can be selected for this AREE.

Response: See response to Comment 26.

ATTACHMENT 3
PROPOSED PLAN

Proposed Plan



AREEs 13, 14, 16-1, 27 and 29-4 Vint Hill Farms Station, Virginia

March 1999

INTRODUCTION

The U.S. Army has identified a preferred alternative to address contaminated soil at selected Areas Requiring Environmental Evaluation (AREEs) located on Vint Hill Farms Station (VHFS). The U.S. Army's preferred alternative is no further action at these AREEs.

This Proposed Plan is based on site-related documents contained in the VHFS Information Repository. The Information Repository can provide you with important information about the site and the five AREEs. The Information Repository is located at:

Fauquier County Library
Warrenton Branch - Reference Section
11 Winchester Street, Warrenton, VA
(540) 347-8750
Monday - Wednesday: 10:00 a.m. to 9:00 p.m.
Thursday - Saturday: 9:00 a.m. to 5:00 p.m.
Sunday: 1:00 p.m. to 5:00 p.m.

The U.S. Army needs your comments and suggestions. The U.S. Army, the U.S. Environmental Protection Agency (USEPA) Region III, and the Virginia Department of Environmental Quality (VDEQ) encourage the public to review and comment on the action presented in the Proposed Plan. The public comment period begins on April 1, 1999, and closes on April 30, 1999. Please send your comments, postmarked no later than April 30, 1999, to:

Kevin Bell, Public Affairs Officer
Building 2500, Helms Road
Vint Hills Farm Station
Warrenton, VA 22187

In addition, you are invited to a public meeting regarding the investigation of the selected AREEs at VHFS. Representatives from the U.S. Army will report on the status of these AREEs and the U.S. Army's preferred alternative. The meeting is scheduled for:

Thursday, April 15, 1999 at 7:00 pm
Building 101 - Former Headquarters Conference Room
Vint Hill Farms Station, Warrenton, VA

Special provisions will be made for the handicapped and hearing impaired.

The remedy described in this Proposed Plan is the U.S. Army's preferred alternative for the selected AREEs. The U.S. Army may modify the preferred alternative or select another remedial alternative if public comments or additional data indicate that such a change will result in a more appropriate remedial action. The U.S. Army, in consultation with USEPA and VDEQ, will make a remedy selection for the AREEs in a Decision Document after the public comment period has ended and the comments and information submitted during that time have been reviewed and considered.

The U.S. Army is issuing this Proposed Plan as part of its public participation responsibilities under Sections 113(k) and 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, commonly known as the "Superfund Program", and the National Environmental Policy Act of 1969 (NEPA). This Proposed Plan focuses on AREEs 13, 14, 16-1, 27 and 29-4. Other areas of VHFS that the U.S. Army plans to remediate are addressed by separate Proposed Plans.

SITE BACKGROUND

VHFS is part of the U.S. Army Communications - Electronics Command (CECOM) and while active, primarily functioned as an Army installation engaged in communications intelligence. VHFS is located approximately 40 miles southwest of Washington, D.C., in Fauquier County, Virginia, as shown on Figure 1. The installation occupies approximately 701 acres of land near the town of Warrenton, Virginia. Approximately 150 acres of the installation are improved grounds in the southern portion of the property used for industrial operations, administration buildings, and residential housing. Approximately 94 acres in the eastern portion of the property are mature hardwood forest, and the majority of the remaining 457 unimproved and semi-improved acres in the northern portion of the property are used for stationary and mobile antenna operation sites.

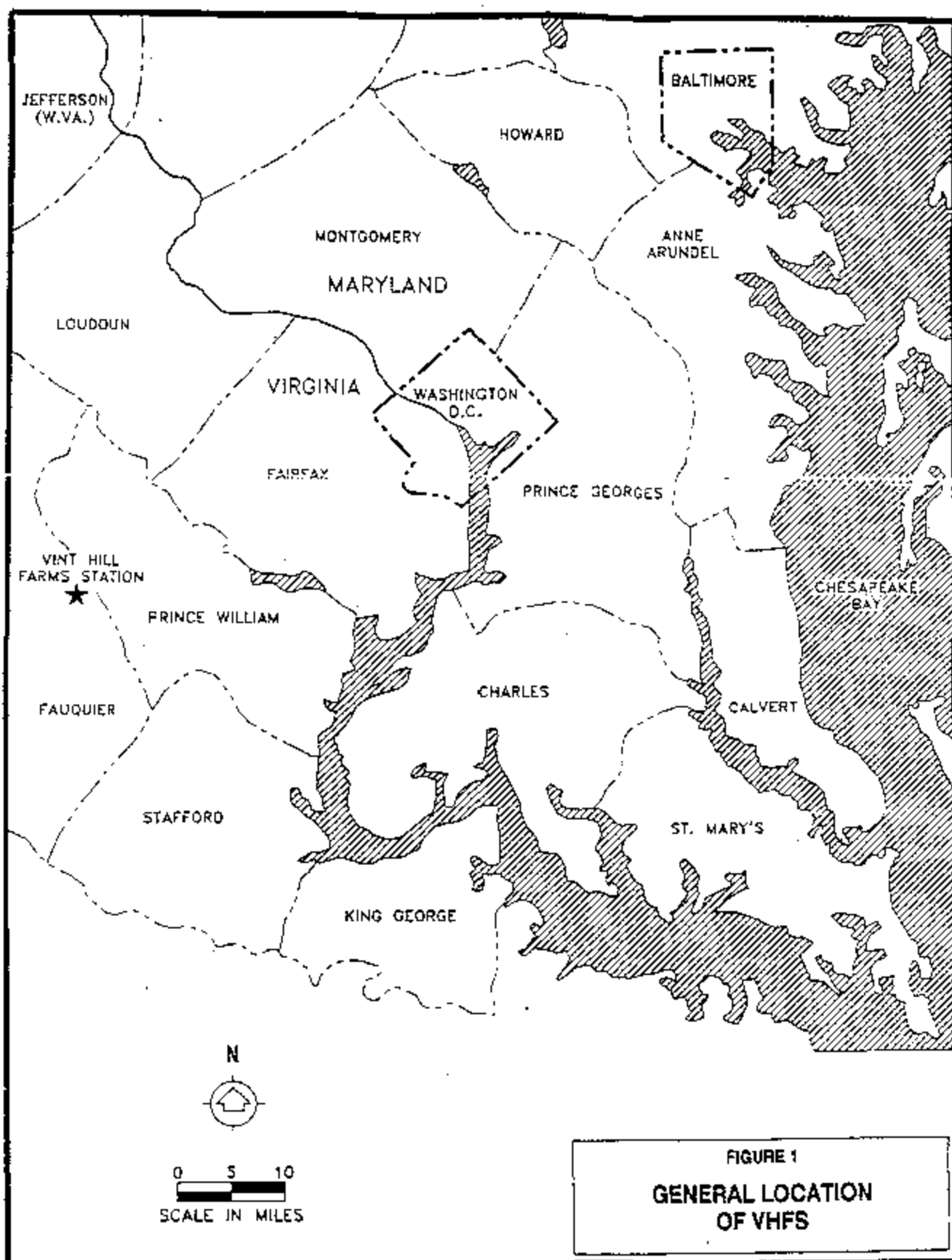
The facility was designated for closure in March, 1993, under the Base Realignment and Closure (BRAC) Act. Pursuant to the decision to close the installation, an Enhanced Preliminary Assessment (ENPA) and a Community Environmental Response Facilitation Act (CERFA) investigation of VHFS were conducted by Science Applications International Corporation (SAIC) to assess the environmental condition of the installation. The ENPA and CERFA investigations were completed in April and May, 1994, respectively. The ENPA identified 42 AREEs from the review of installation records, aerial photographs, installation personnel interviews, federal and state regulatory records, and visual inspection. Of these 42 AREEs, 27 were recommended for further investigation.

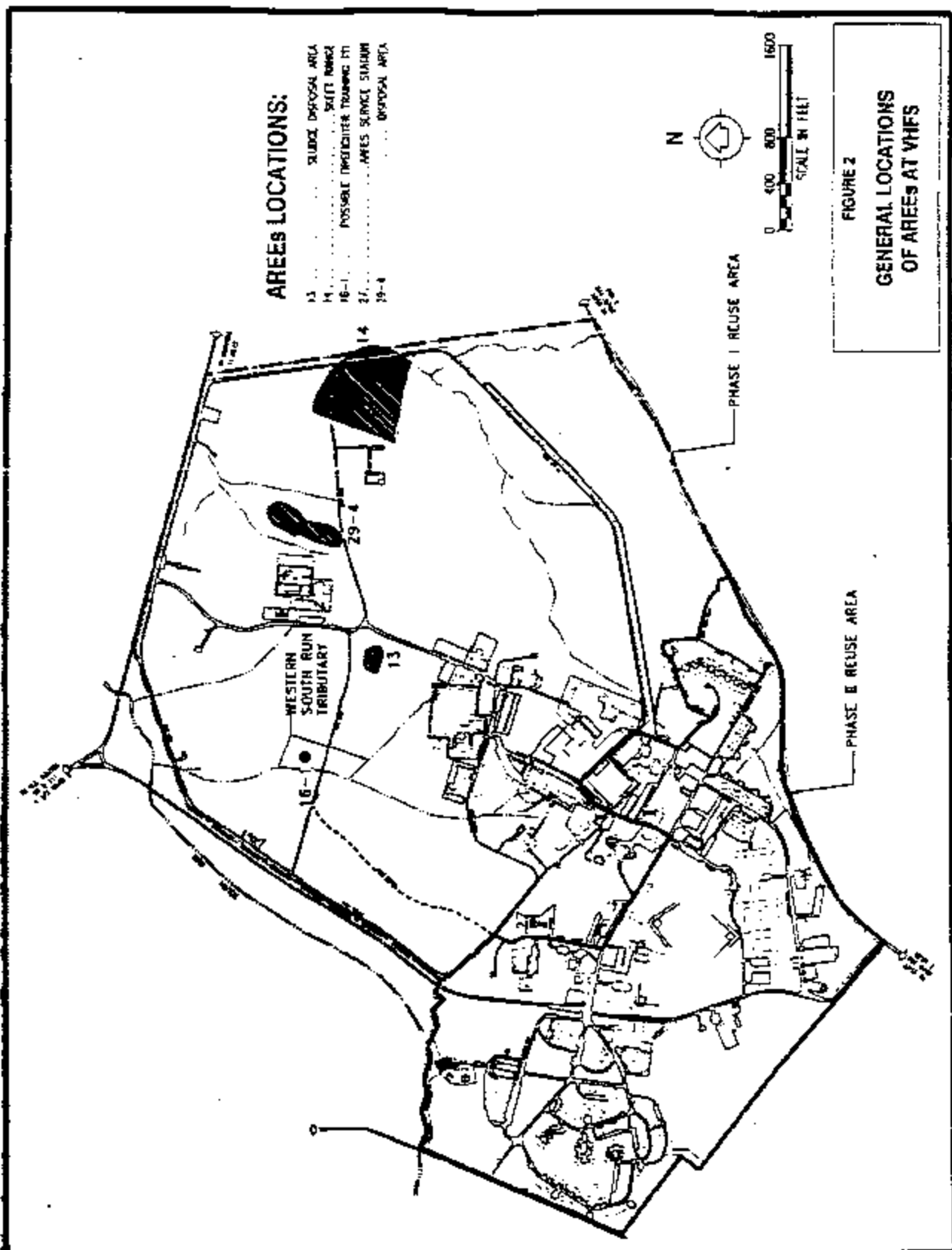
These 27 AREEs were investigated from September, 1994, to June, 1995, as part of the Site Inspection (SI) conducted by SAIC. The objective of the SI was to determine the presence or absence of contamination and the chemical nature of any detected contamination. The final SI Report which was completed in June, 1996, identified 24 AREEs which required further investigation. In addition, four new AREEs were identified during site reconnaissance to warrant further investigation subsequent to the SI. AREEs that were determined to warrant further investigation were investigated as part of the Phase I and Phase II reuse area Remedial Investigations (RIs), and the Supplemental Remedial Investigation (SRI) conducted by ICF Kaiser Engineers, Inc. (ICF KE). The purposes of these reports were to evaluate: 1) the nature and extent of contamination; and 2) the level of risk posed to human health and the environment. The final RI Reports for the Phase I and Phase II reuse areas were completed in April, 1998, and January, 1999, respectively. The draft SRI Report was completed in November, 1998, and is currently undergoing regulatory review.

Five AREEs were identified in the RIs and SRI as having soil contamination which poses no unacceptable human health risks and/or significant adverse ecological effects:

- ! AREE 13 – Sludge Disposal Area;
- ! AREE 14 – Skeet Range;
- ! AREE 16-1 – Possible Firefighter Training Pit;
- ! AREE 27 – AAFES Service Station; and
- ! AREE 29-4 – Disposal Area.

The locations of these AREEs are shown on Figure 2.





RESULTS OF THE REMEDIAL INVESTIGATION

The RIs for these five AREEs were conducted to evaluate the nature and extent of contamination associated with past site activities. Environmental samples collected and analyzed during the RIs were used in conjunction with the results from the SI to assess the condition of each of the AREEs. The environmental media investigated included surface soil (0 to 2 feet below ground surface [bgs]), subsurface soil (greater than 2 feet bgs), surface water, sediment, and groundwater. Analytical results were compared to background concentrations and regulatory screening levels to determine if environmental media had been adversely impacted by site activities. A brief description of each of the five AREEs and the significant findings of the RIs and SI are presented in the following paragraphs. A detailed presentation of the samples collected and the analytical results can be found in the final Phase I Reuse Area RI Report and the final Phase II Reuse Area RI Report now available in the Information Repository at the Fauquier County Library.

AREE 13 – Sludge Disposal Area

The Sludge Disposal Area was used during the 1980s to dispose of sludges from the sewage treatment plant (STP) and the former STP, and sand filter sludge and sandblasting waste from the Electric Equipment Facility. In 1982, the sludges were analyzed for total metals and were determined to be at concentrations sufficiently low for land spreading. The sludge pile was 75 feet in diameter and 3 feet high. In 1992, the area was closed, with twenty thousand cubic feet of sludge being excavated, mixed with pressed sludge cake from the STP digester, and transported to the Fauquier County Landfill. The area has been backfilled and seeded.

Surface and subsurface soil samples were collected at locations within the disposal area. Iron (75,200 to 230,000 parts per million [ppm]) was the only analyte detected above its residential soil RBC (23,000 ppm) and maximum background concentration (70,800 ppm).

AREE 14 – Skeet Range

AREE 14 was used on weekends as a skeet range between 1961 and 1994. The spent ammunition, consisting of lead and steel shotgun pellets, was spread over the range and remains unrecovered. The skeet range firing fan is oriented eastward in an 800-foot radius and is separated into the Hit and Miss Zones.

Surface soil samples collected from two locations in the Miss Zone contained lead concentrations (940 ppm, and 414 - 650 ppm) that exceeded the USEPA screening level for lead in residential soil of 400 ppm.

AREE 16-1– Possible Firefighter Training Pit

The Firefighter Training Pit was used monthly by the VHFS Fire Department for training in the mid-1970s. The unlined pit was approximately 50 feet in diameter and 3 feet deep. During training activities, the pit was partially filled with petroleum and natural gas odorant and then ignited. Solvents and other combustible materials may have also been used in the pit. In the mid-1980s, the pit was filled with ½-inch gravel.

Total petroleum hydrocarbon (TPH) field screening of the soil at AREE 16-1 was conducted to delineate the area of contamination and to determine where soil samples should be collected for laboratory analysis. Surface soil samples were collected based on positive TPH results from the field screening. Arsenic (up to 21.6 ppm) exceeded its residential soil RBC (0.43 ppm) as well as its maximum background concentration (4.89 ppm) in the surface soil samples collected at AREE 16-1. A number of dioxins/furans, indicative of combustion operations, were detected in the surface soil samples. 2,3,7,8-TCDD (2.74E-04 ppm) was the only dioxin/furan to exceed its residential soil RBC (4.3E-06 ppm).

AREE 27 – AAFES Service Station

The AAFES Service Station (Building 238) was constructed in 1969 to provide fuel and service for VHFS personnel vehicles. The service station had underground storage tanks (USTs) for three grades of

gasoline, a pump area, and a service station area with two lifts. Drains in the pump island area lead to a grit chamber, which discharges to a field north of the facility. In addition, a fenced storage area was located in the rear of the facility for tires, batteries, and drums. Several gasoline, oil, and other spills were reported in this area. In April, 1993, pressure testing of the regular unleaded gasoline pipeline confirmed a suspected leak. A 0.5-inch hole was found in the pipeline within the pump area. The corroded section of pipe was replaced, and the soils around the area where the leak occurred were excavated and then backfilled. The system was re-tested to ensure no other leaks existed, and the pump was re-opened. During the summer and fall of 1993, field investigations confirmed soil and groundwater contamination due to the release of gasoline from one or more leaking USTs and associated distribution piping. The USTs were closed in June, 1994, and removed in November, 1994. Operations at the AAFES Service Station were discontinued in the fall of 1994. Contaminated soil removal and groundwater remediation activities at the AAFES Service Station have been initiated and are being handled separately from the rest of AREE 27.

Surface and subsurface soil samples were collected from areas of potential contamination: downgradient from the discharge point of the grit chamber, at the service bay spill run-off area; and in the tire storage area. Arsenic (up to 12.2 ppm) was found to exceed its residential soil RBC (0.43 ppm) and maximum background concentrations (4.89 ppm surface soil and 5.4 ppm subsurface soil) in most of the surface and subsurface soil samples. Lead was detected in a surface soil sample at the discharge point of the grit chamber at a concentration of 1,200 ppm, which is three times the USEPA screening level of 400 ppm for lead in residential soils. The maximum TPH concentration detected was 2,310 ppm, which is significantly higher than the State's TPH soil action level of 100 ppm for UST sites, in the surface soil sample collected at the discharge point of the grit chamber. TPH (737 ppm) was also detected above the State's TPH soil action level for UST sites in the surface soil at the service bay spill run-off area immediately off the parking pad. However, TPH did not exceed the State's TPH soil action level for UST sites downhill from the grit chamber, further along the spill run-off pathway, or in subsurface soils, indicating small localized areas of contamination. Other than arsenic, none of the analytes were found to exceed their associated screening levels in the subsurface soil samples.

AREE 29-4 – Disposal Area

The Disposal Area is located near the northeast corner of VHFS, northwest of the Skee: Range (AREE 14). Review of aerial photographs of this area provided evidence of disposal activities as early as 1958. These signs were visible to various extents as late as 1977. A total of five distinct areas were located within the Disposal Area, based on ground stains and debris visible in aerial photographs. Two areas were used for construction debris disposal and are now enclosed within groves of trees. Another area is an approximately 30-foot wide man-made depression in the ground where water collects after rain events. It is not known whether the area was used to obtain fill material or for liquid disposal. The last two sites appeared as orange-stained areas in historic aerial photographs. These are both currently level and covered with grass. It is not known what materials, if any, were stored in these areas.

Surface soil samples were collected at the two construction debris piles and at the three other areas of potential contamination. Aluminum (85,000 ppm), beryllium (2.15 ppm), and iron (160,000 ppm) concentrations in surface soil in the area of the former orange mound exceeded residential soil RBCs (78,000 ppm, 0.15 ppm, and 23,000 ppm, respectively) and maximum background concentrations (20,900 ppm, 2.13 ppm, and 70,800 ppm, respectively). Benzo(a)pyrene (0.1 ppm) slightly exceeded its residential soil RBC (0.088 ppm) in one surface soil sample collected from the construction debris areas. Arsenic (up to 13.6 ppm) exceeded its residential soil RBC (0.43 ppm) and maximum background concentration (4.89 ppm) at the construction debris areas.

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

A Baseline Risk Assessment (BRA) was conducted as part of the RIs to assess the human health and ecological problems that could result if the contamination at the AREEs was not remediated. The Human Health Risk Assessment (HHRA) was prepared to evaluate the magnitude of potential adverse effects on

human health associated with current and potential future (assuming residential development of the property) exposures to site-related chemicals at the AREEs. The Ecological Risk Assessment (ERA) was conducted to characterize the potential threats to ecological receptors posed by contaminants at the AREEs.

The HHRA follows a four-step process:

- Selection of Chemicals of Potential Concern - identifies the contaminants of potential concern based on their toxicity, frequency of occurrence, and concentration by comparing the maximum concentrations of detected chemicals with RBCs which are health-protective chemical concentrations that are back-calculated using toxicity criteria, a 1×10^{-6} target carcinogenic risk or a 0.1 hazard quotient (defined below), and conservative exposure parameters;
- Exposure Assessment - identifies the potential pathways of exposure, and estimates the concentrations of contaminants to which people may be exposed as well as the frequency and duration of these exposures;
- Toxicity Assessment - determines the toxic effects of the contaminants; and
- Risk Characterization - provides a quantitative assessment of the overall current and future risk to people from site contaminants based on the exposure and toxicity information.

The HHRA evaluated health effects which could result from exposure to soil, groundwater, surface water, and sediment contamination in the Phase I and Phase II reuse areas of VHFS. The HHRA evaluated potential risks to current workers who could be exposed to contaminants in surface soil, and to current trespassers who could be exposed to contamination in surface soil, surface water, and sediment. In addition, the HHRA evaluated potential risks to hypothetical future adult residents who could be exposed to contaminants in groundwater and surface soil and to hypothetical future child residents who could be exposed to contaminants in groundwater, surface soil, surface water, and sediment. Potential risks to future excavation workers who could be exposed to contaminants in subsurface soil were also evaluated in the HHRA.

Potential carcinogenic (cancer-related) effects and noncarcinogenic effects (including various impacts on different organ systems, such as lungs, liver, etc.) were evaluated in the HHRA. Carcinogenic effects are expressed as the probability that an individual will develop cancer from exposure to the contaminants from each AREE. The evaluation of noncarcinogenic effects is based on the hazard index (HI), which is the summation of the hazard quotients for individual chemicals. The hazard quotient is a comparison of chemical-specific chronic exposure doses with the corresponding protective doses derived from health criteria. The USEPA recommends that remedial actions may be warranted at sites where the carcinogenic risk to any person is greater than 1×10^{-4} or the HI is greater than 1. A carcinogenic risk of 1×10^{-4} means that there is a potential of one additional person in a population of 10,000 developing cancer from exposure to contaminants at an AREE if the AREE is not remediated. A HI greater than 1 indicates a potential for noncarcinogenic health effects if the AREE is not remediated.

The ERA also follows a four-step process:

- Problem Formulation - develops information that characterizes habitats and potentially exposed species and identifies contaminants of concern, exposure pathways, and receptors;
- Exposure Assessment - estimates exposure point concentrations for selected indicator species;
- Ecotoxicologic Effects Assessment - identifies concentrations or doses of contaminants that are protective of indicator species; and
- Risk Characterization - estimates potential adverse effects from exposure to contaminants based on exposure and toxicity information.

The ERA evaluated ecological effects which could result from exposure to surface soil, surface water, and sediment contamination in the Phase I and II reuse areas of VHFS. The ERA evaluated potential adverse ecological effects to terrestrial plants and terrestrial invertebrates (represented by earthworms) exposed to contaminants in surface soil. In addition, potential adverse ecological effects to mammals (represented by

shrews) and birds (represented by robins) through bioaccumulation in the food web and exposure to contaminants in surface soil were evaluated. Potential adverse ecological effects to aquatic life from exposure to contaminants in surface water and sediment were also evaluated in the ERA.

The evaluation of significant potential adverse ecological effects is based on the Environmental Effects Quotient (EEQ). The EEQ is the ratio of the estimated exposure concentration/doses for the chemicals of potential concern and the toxicity reference values (TRVs) for the ecological receptors. If the EEQ is greater than 1, there is a potential for adverse ecological effects to occur. As the magnitude of the EEQ becomes greater than 1, the potential for adverse ecological effects becomes more significant.

The results of the BRA for the five AREEs are presented in the following paragraphs. A detailed presentation of the BRA can be found in the final Phase I Reuse Area RI Report and the final Phase II Reuse Area RI Report now available in the Information Repository at the Fauquier County Library.

AREE 13 - Sludge Disposal Area

The HHRA determined that site-related contamination at AREE 13 does not pose an unacceptable human health risk under either current or potential future land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated excess lifetime cancer risk (8×10^{-6}) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risk ($HI = 10$) is for child residents exposed to contaminants in surface soil by incidental ingestion. The contaminant that drove the elevated HI at AREE 13 is iron which was detected at comparable levels in similar subsurface soil types in background locations and is, therefore, not site-related. An ERA was not conducted at AREE 13 because all samples were collected at depths of greater than 6 inches. Based on these results, no further action is recommended at AREE 13.

AREE 14 - Skeet Range

The HHRA concluded that, under both current and future land-use conditions, site-related contamination at AREE 14 does not pose an unacceptable human health risk, except for lead in surface soil. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk (4×10^{-6}) is for adult residents and child residents exposed to contaminants in surface soil by dermal absorption and incidental ingestion respectively; and the highest noncarcinogenic risk ($HI = 0.8$) is for adult residents exposed to contaminants in surface soil by dermal absorption.

The human health risks associated with exposure to lead contamination in surface soil at AREE 14 were evaluated using the Integrated Exposure Uptake Biokinetic (IEUBK) Model recommended by USEPA for evaluating lead exposures for young children in residential settings. The IEUBK Model calculates blood lead levels which result from exposures to lead which may then be compared to blood lead levels of toxicological significance for purposes of risk evaluation. The IEUBK Model run for AREE 14 predicted a geometric mean blood lead level of 5.2 $\mu\text{g}/\text{dL}$, with 7.75 percent of the population exceeding the blood lead level of concern (10 $\mu\text{g}/\text{dL}$). The USEPA currently finds 5 percent of the population exceeding the blood lead level of concern acceptable. Therefore, the IEUBK Model results indicate that if AREE 14 was developed for residential use in the future, the lead concentrations in the surface soil may be a potential problem for young children.

The ERA determined that surface soil at AREE 14 does not pose significant potential adverse ecological effects.

The potential adverse effects to child residents were driven by the presence of lead above the USEPA screening level for lead in residential soil of 400 ppm at two locations in the Miss Zone. The extent of lead contamination in the two locations that drove unacceptable human health risks was further investigated during the SRI. Soil in those two locations was excavated, and the sample results from the remaining soil show that lead concentrations do not exceed the USEPA screening level for lead in residential soil. Thus, no further action is recommended at AREE 14 because the unacceptably high lead concentrations were

removed during the SRI. A detailed presentation of the investigation of lead hot spots at AREE 14 can be found in the draft SRI Report now available in the Information Repository at the Fauquier County Library.

AREE 16-1 - Possible Firefighter Training Pit

Results of the HHRA indicate that, under both current and future land-use conditions, the risks to workers, trespassers, and residents are acceptable for exposure to site-related contaminants in surface soil. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk (9×10^{-5}) is for adult residents and child residents exposed to site-related contaminants in surface soil by dermal absorption and incidental ingestion, respectively; and the highest noncarcinogenic risk ($HI = 1$) is for child residents exposed to site-related contaminants in surface soil by incidental ingestion. Although the total HI equals 1, the HIs recalculated by target organ/critical effect are all less than 1. No significant potential for adverse ecological effects were found in the ERA. Based on these results, no further action is recommended at AREE 16-1.

AREE 27 - AAFES Service Station

Results of the HHRA suggested that site-related contamination at AREE 27 does not pose an unacceptable human health risk under either current or future land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background levels, the highest estimated upper-bound excess lifetime cancer risk (7×10^{-5}) is for child residents exposed to contaminants in surface soil by dermal absorption, and the highest noncarcinogenic risk ($HI = 2$) is for child residents exposed to site-related contaminants in surface soil by dermal absorption. When recalculated by target organ/critical effect, the HI equals 1.3 for the kidneys, primarily as a result of exposures to chromium in surface soil at AREE 27. Although not all chromium present at AREE 27 will be hexavalent chromium (i.e., the most toxic form of chromium), the conservative toxicity criterion for hexavalent chromium was used in the HHRA. Therefore, a HI of 1.3 calculated using conservative toxicity criteria is considered acceptable.

As explained in the AREE 14 discussion, lead contamination in surface soil at AREE 27 was evaluated using the IEUBK Model which predicted a geometric mean blood lead level of 3.2 $\mu\text{g}/\text{dL}$, with 0.77 percent of the population exceeding the blood lead level of concern (10 $\mu\text{g}/\text{dL}$). Again, the USEPA currently finds 5 percent of the population exceeding the blood lead level of concern acceptable. Therefore, the surface soil lead concentrations at AREE 27 are unlikely to have an adverse effect on the exposed child resident population.

The ERA determined that site-related contaminants at AREE 27 posed no significant potential for adverse ecological effects.

Based on these results, no further action is recommended at AREE 27.

AREE 29-4 - Disposal Area

The HHRA determined that site-related contamination at AREE 29-4 does not pose an unacceptable human health risk under either current or future land-use conditions. Discounting naturally-occurring metals that were statistically determined to be within background concentrations, the highest estimated upper-bound excess lifetime cancer risk (3×10^{-5}) is for child residents exposed to contaminants in surface soil by incidental ingestion, and the highest noncarcinogenic risk ($HI = 1$) is for child residents exposed to site-related contaminants in surface soil by incidental ingestion. The ERA concluded that significant potential adverse ecological effects are not posed by the site-related contaminants at AREE 29-4. Based on these results, no further action is recommended at AREE 29-4.

PREFERRED ALTERNATIVE

No further action is recommended by the U.S. Army as the preferred alternative for AREEs 13, 14, 16-1, 27, and 29-4 because these sites do not pose unacceptable human health or ecological risks. The estimated cost to implement this alternative is \$0.